

**PCGC - Pressure Case Gamma**  
**PCDC - Pressure Case Directional**

1 : 240

[illegible]

## WELL INFORMATION

<b>MWD Run Number</b>	100	200	300		
<b>Date run completed</b>	30-Jul-14	02-Aug-14	06-Aug-14		
<b>Rig Bit Number</b>	0100	0200	0300		
<b>Bit Size (in)</b>	13.500	8.750	6.125		
<b>Tool Nominal OD (in)</b>	6.880	6.750	4.860		
<b>Log Start Depth (MD, ft)</b>	219.00	993.00	7,753.00		
<b>Log End Depth (MD, ft)</b>	993.00	7,753.00	12,220.00		
<b>Drill or Wipe</b>	Drill	Drill	Drill		
<b>Drill/Wipe Start Date and Time</b>	29-Jul-14 16:30	31-Jul-14 10:00	03-Jul-14 23:30		
<b>Drill/Wipe End Date and Time</b>	29-Jul-14 21:00	02-Aug-14 11:30	05-Aug-14 09:30		
<b>Min Inc (deg) @ Depth (MD, ft)</b>	0.11 @ 142.00	0.17 @ 993.00	89.47 @ 12,057.00		
<b>Max Inc (deg) @ Depth (MD, ft)</b>	0.37 @ 329.00	85.12 @ 7,706.00	92.32 @ 10,251.00		
<b>Bit TFA(in2) / Bit Type</b>	1.49 / PDC	1.18 / PDC	1.53 / PDC		
<b>Flow Rate (gpm)</b>	515.00	584.25	299.42		
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A	N/A / N/A	N/A / N/A		
<b>Fluid Type</b>	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud		
<b>Density (ppg) / Viscosity (spqt)</b>	9.00 / 40.00	9.20 / 35.00	9.60 / 38.00		
<b>Filtrate CL (ppm)</b>	1,000.00	650.00	650.00		
<b>pH / Fluid Loss (mptm)</b>	N/A / N/A	8.60 / 0	9.40 / 5		
<b>PV (cP) / YP (lbf2)</b>	13 / 12.00	10 / 9.00	11 / 12.00		
<b>% Solids / % Sand</b>	8.5 / .5	5.5 / .35	7.2 / .6		
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	N/A / N/A	N/A / N/A		
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Max Tool Temp (in F) / S</b>	221.12 / PDM	125.22 / PDM	N/A / N/A		

Max Tool Temp (degF) / Source	96.42 / PCM	185.02 / PCM	N/A / N/A		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	James Tilley	James Tilley	James Tilley		
Customer Representative	Jim Baker	Sam Tyler	Sam Tyler		

## SENSOR INFORMATION

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	51.32	44.89	41.75		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404289	11404267	12365892		
Sonde Serial Number	12177531	12177531	12177531		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	236.90	5.65	59.14		

### Gamma Ray Sensor Information

Tool Type		PCG	PCG		
Distance From Bit (ft)		49.84	46.70		
Recorded Sample Period (sec)		10	10		
Software Version		8.15	8.15		
Sub Serial Number		11404267	12365892		
Insert/Sonde Serial Number		11293376	11293376		

### Pulser Controller Sensor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
PIC Software Version	1.40	1.40	1.40		
Sub/HOC Serial Number	11404289	11404267	12365892		
Insert/Probe/Module SN	11680786	11680786	11680786		
Battery Serial Number	N/A	N/A	N/A		
Valve Insert SN	N/A	N/A	N/A		
DC Insert Serial Number	N/A	N/A	N/A		
Choke Size (32nd)	N/A	N/A	N/A		
Driver Current (amps)	N/A	N/A	N/A		
Driver SMI Current (amps)	N/A	N/A	N/A		
Boot Strap Version	4,130.00	4,130.00	4,130.00		

## REMARKS

1. All depths are true vertical depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded data unless otherwise specified.
4. The final survey is a projection at the bit.
5. Gap here is due to a malfunction of the Pason computer and subsequent loss of depth tracking.
6. The following smoothing parameters have been applied to the data:  
PGRC (Corrected Gamma Ray):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft

ROPA (Average Rate Of Penetration):  
Interval Resolution: 0.5 ft

Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft  
Gap Fill: 3.0 ft

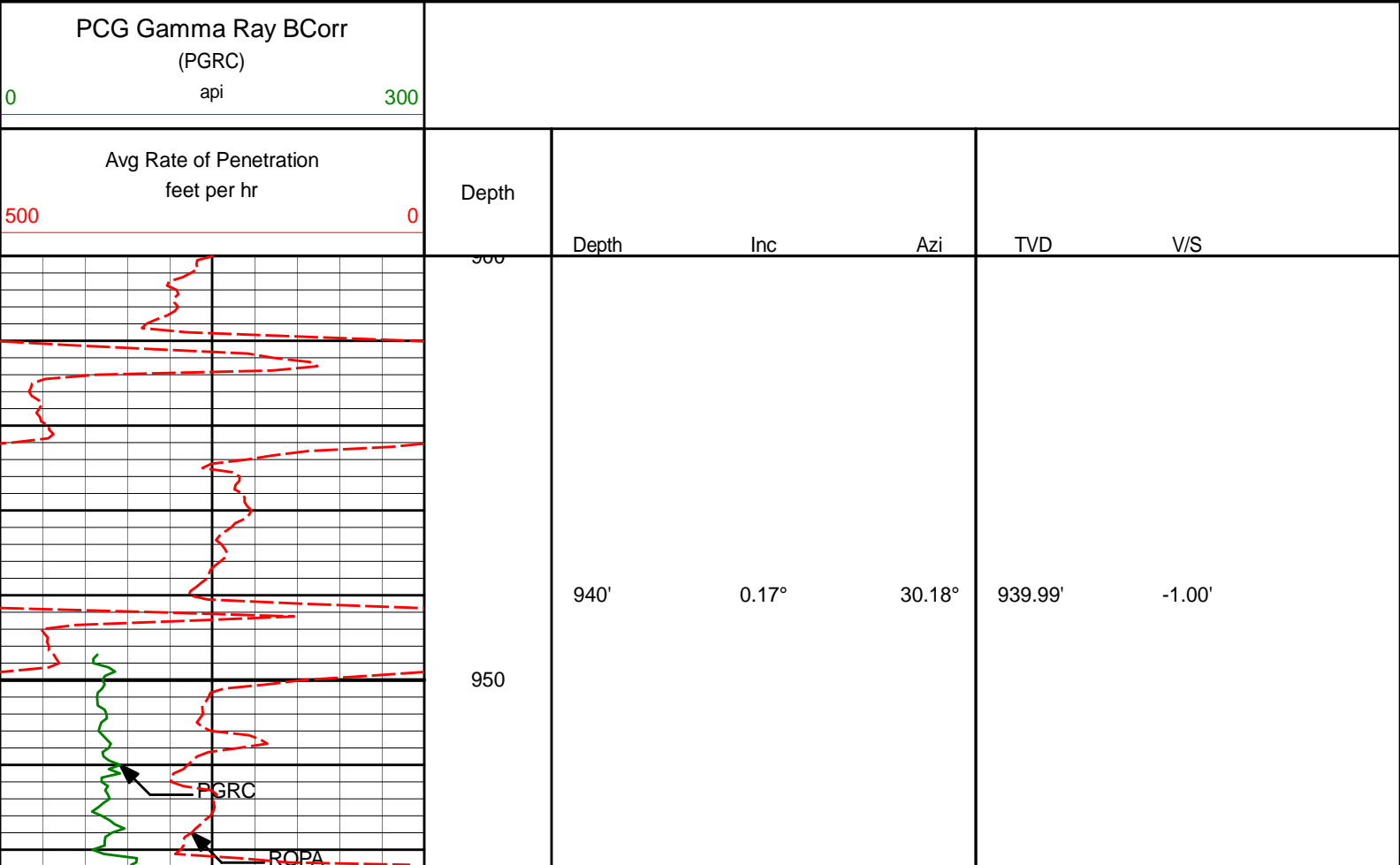
Insite version: 8.0.2

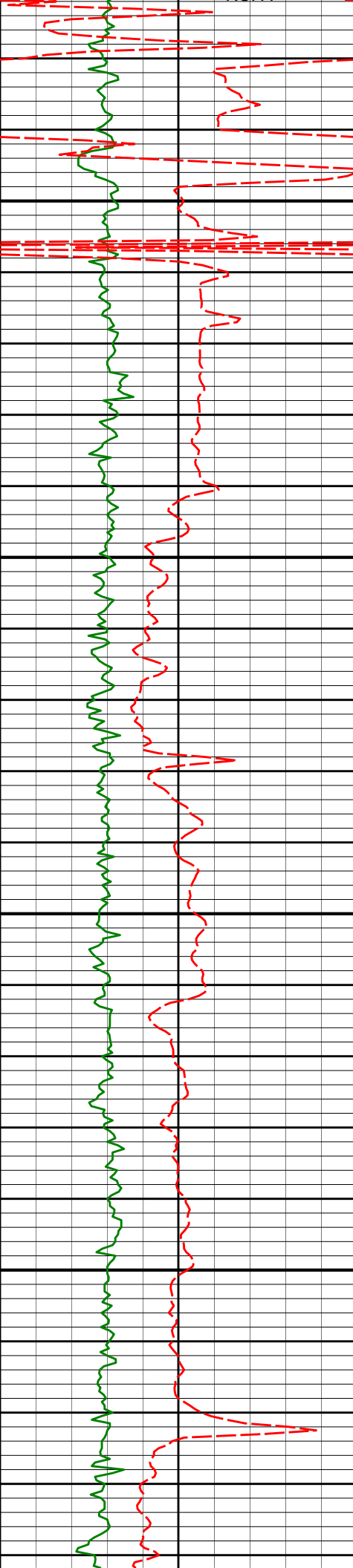
WARRANTY

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HALLIBURTON

MD Main Log 1:240





9.625" Casing Shoe @ 983' MD

1000  
Run 200

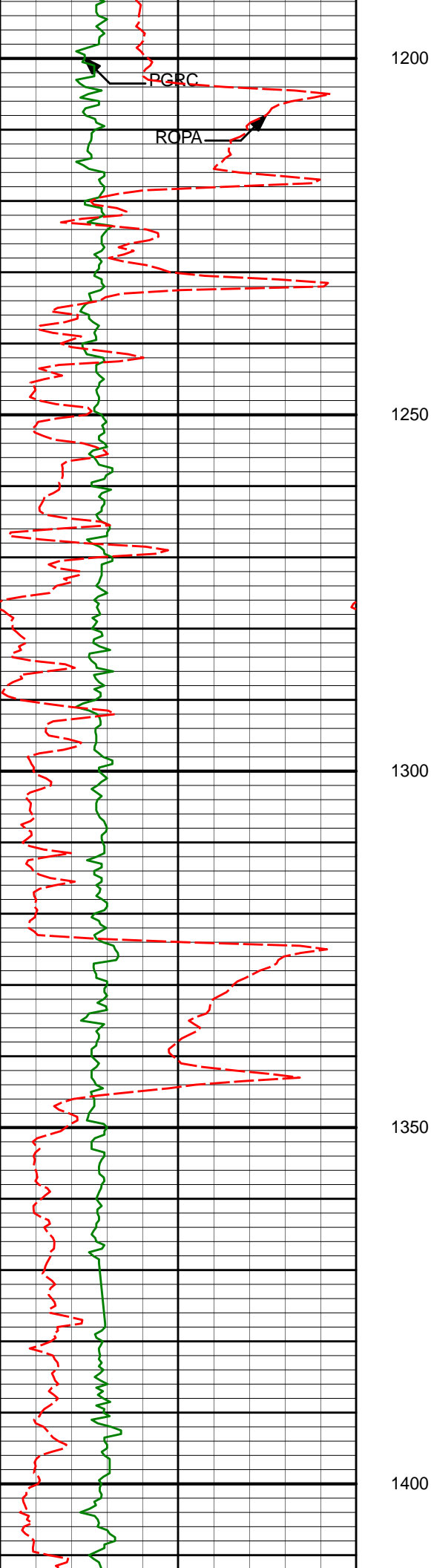
1033'	0.52°	337.43°	1032.99'	-1.51'
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1050

1100

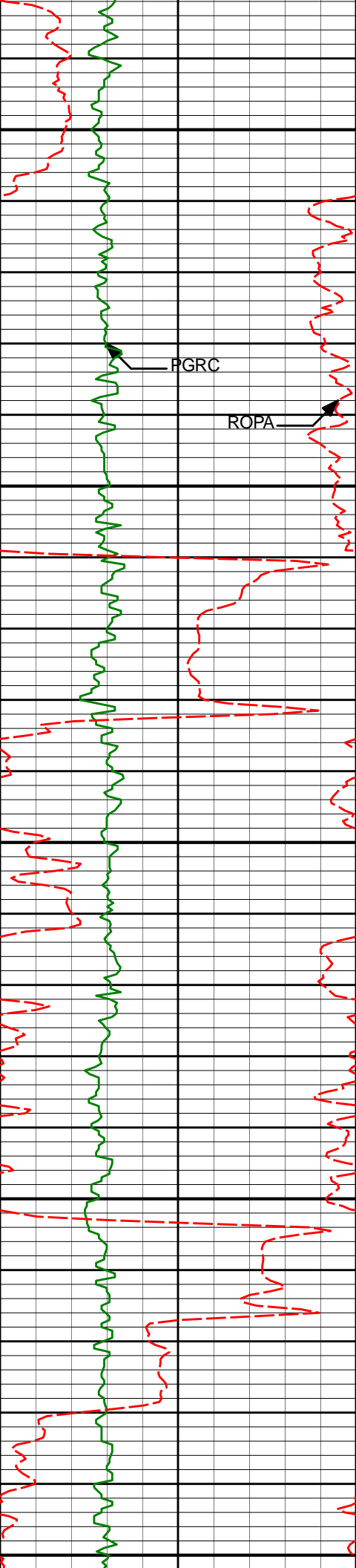
1098'	0.48°	333.34°	1097.99'	-2.03'
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1150



1192	0.51	0.43	1191.99	-2.60
1287'	1.52°	56.77°	1286.97'	-3.91'
1381'	4.27°	65.48°	1380.84'	-6.04'





1650

1663'

8.25°

69.03°

1660.99'

-17.76'

1700

1750

1800

1850

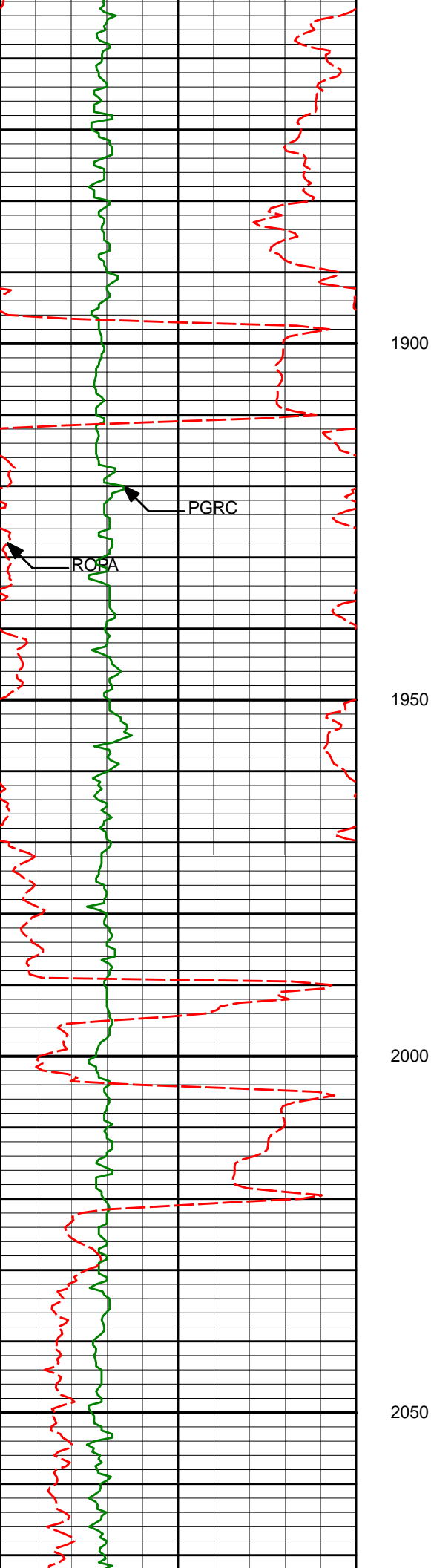
1851'

12.44°

76.12°

1845.90'

-27.45'



1946'

13.62°

75.55°

1938.45'

-32.70'

2040'

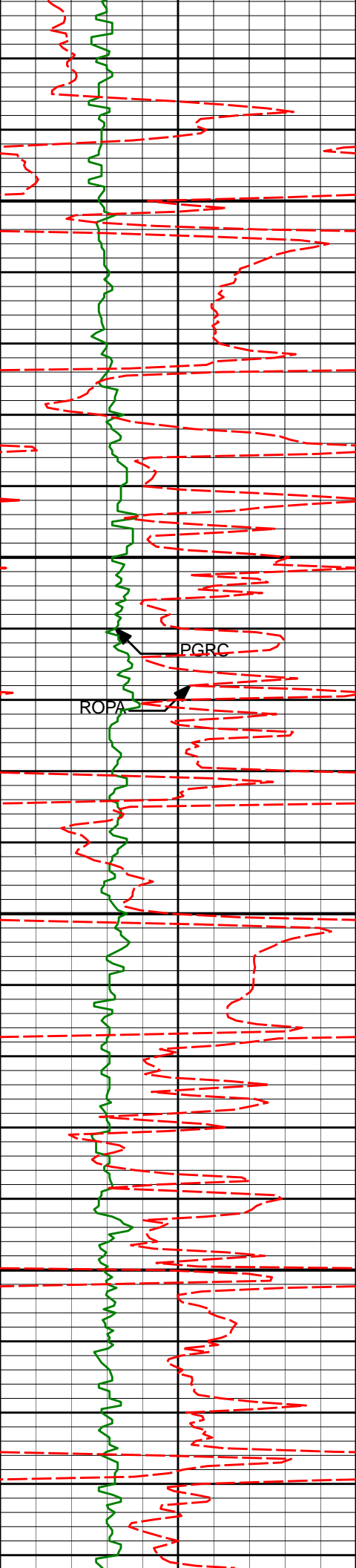
15.12°

75.61°

2029.51'

-38.51'





2100

2134'

17.01°

71.44°

2119.83'

-45.93'

2150

PGRC

ROPA

2200

2228'

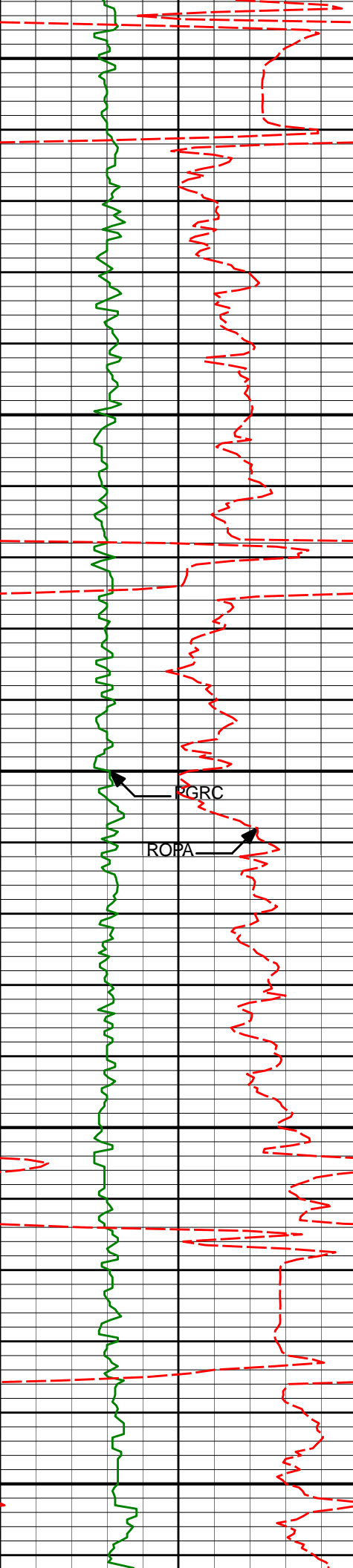
18.24°

69.49°

2209.42'

-55.46'

2250



2300

2323'

19.84°

68.03°

2299.22'

-66.70'

2350

2400

RGRC

ROPA

2416'

18.83°

69.49°

2386.97'

-77.87'

2450

2500

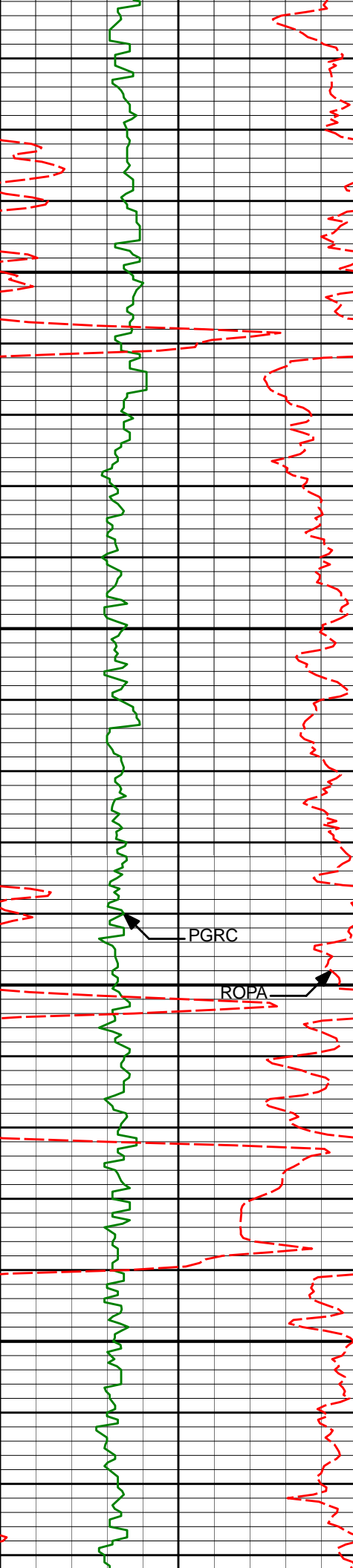
2511'

20.04°

67.67°

2476.56'

-89.42'



2550

2600

2650

2700

2605'

19.30°

68.76°

2565.08'

-101.17'

PGRC

ROPA

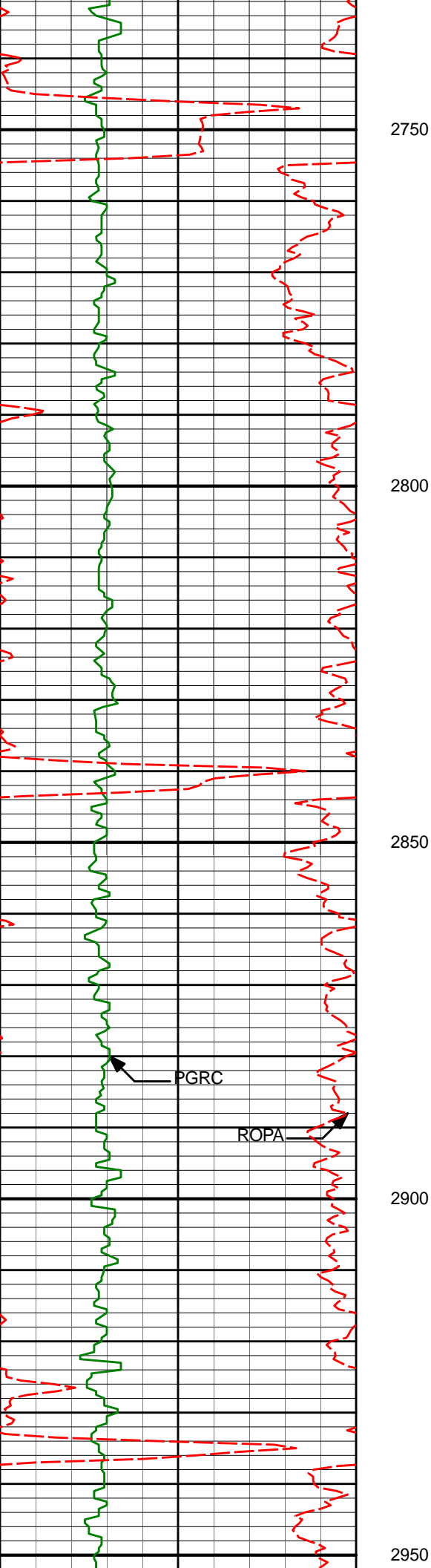
2699'

20.60°

65.07°

2653.44'

-113.77'



2750

2793'

20.84°

65.22°

2741.36'

-127.75'

2800

2850

PGRC

ROPA

2887'

20.95°

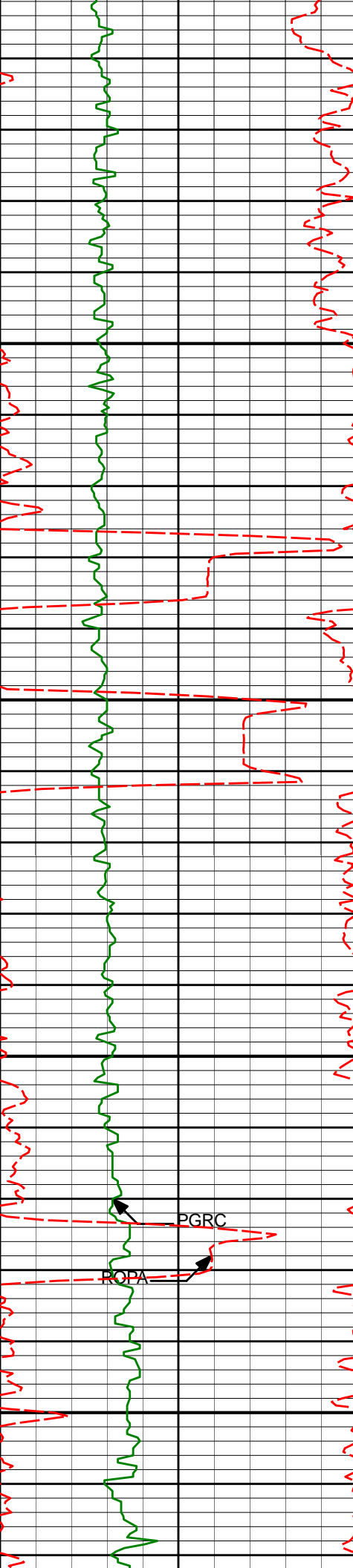
65.71°

2829.17'

-141.67'

2900

2950



3000

3050

3100

3150

PGRC

POPA

2983'

21.33°

65.79°

2918.71'

-155.89'

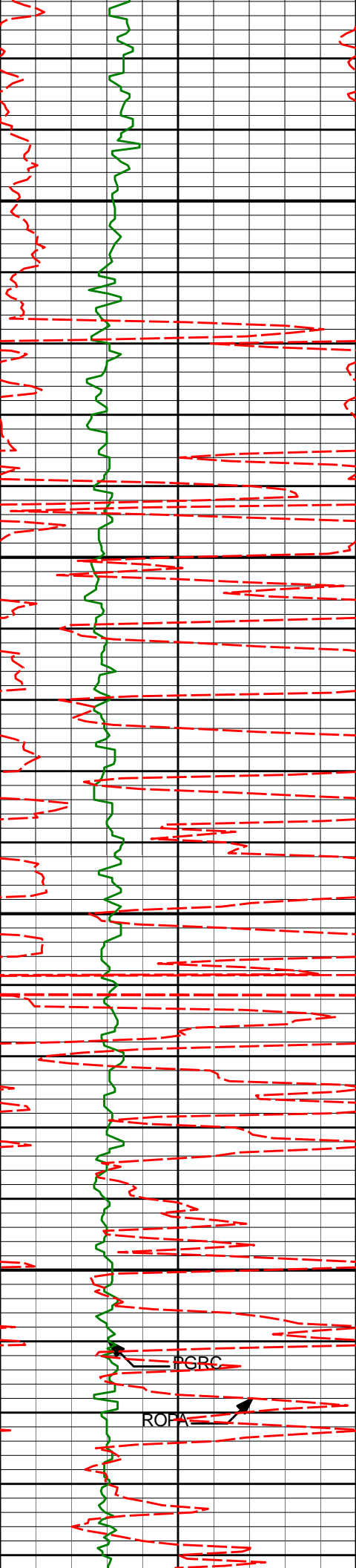
3077'

20.13°

68.98°

3006.63'

-168.70'



3200

3250

3300

3350

PGRC

ROPA

3267'

18.73°

69.62°

3185.98'

-191.34'

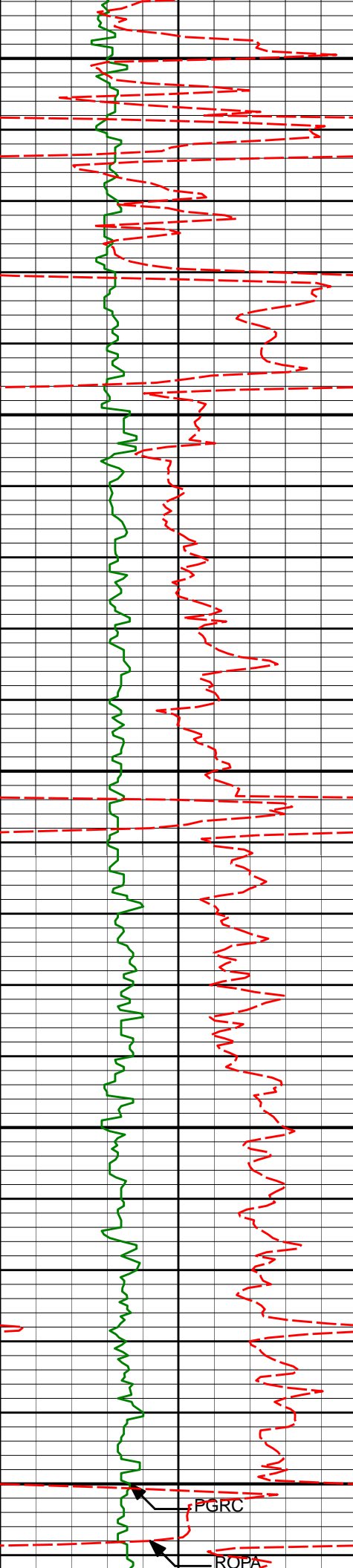
3363'

17.81°

68.26°

3277.14'

-202.14'



3400

3450

3500

3550

3600

3458'

18.03°

63.94°

3367.54'

-213.98'

3553'

16.68°

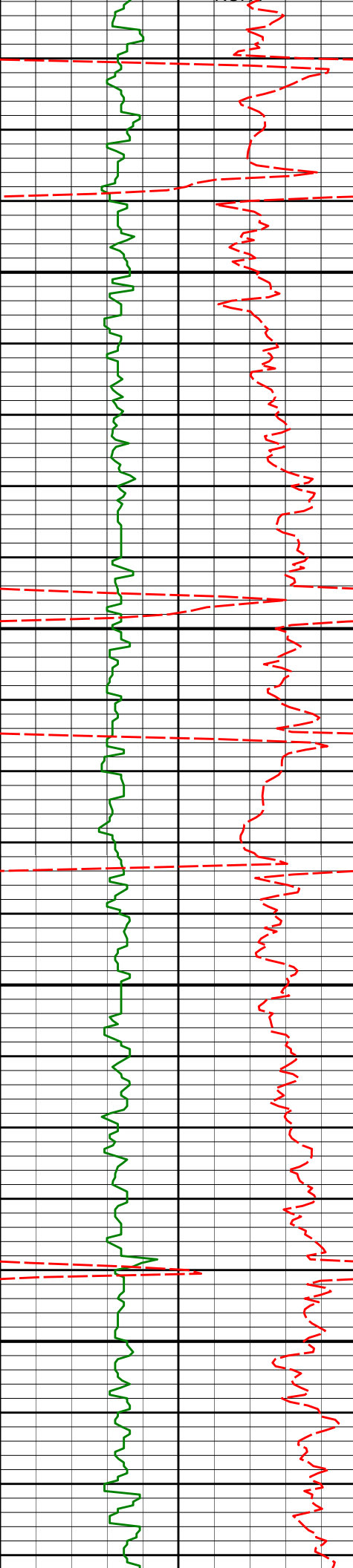
62.87°

3458.21'

-226.66'

PGRC

ROPA



3650

3700

3750

3800

3648'

17.51°

65.86°

3549.01'

-238.72'

3743'

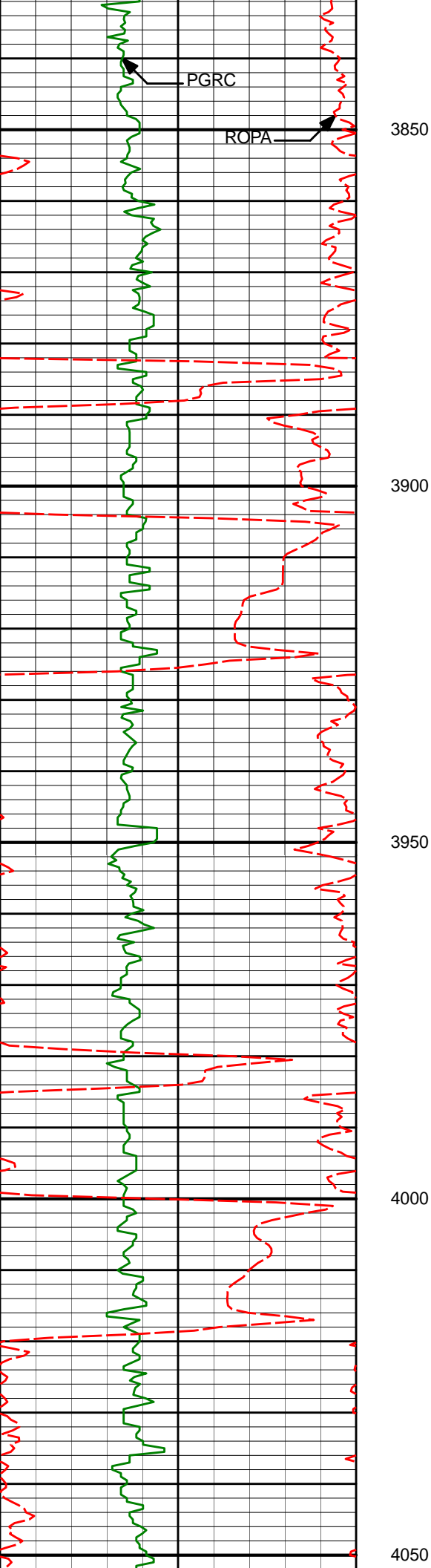
19.09°

65.94°

3639.20'

-250.90'





3838'

16.80°

64.06°

3729.58'

-263.24'

3850

3900

3933'

17.46°

68.01°

3820.37'

-274.58'

3950

4000

4028'

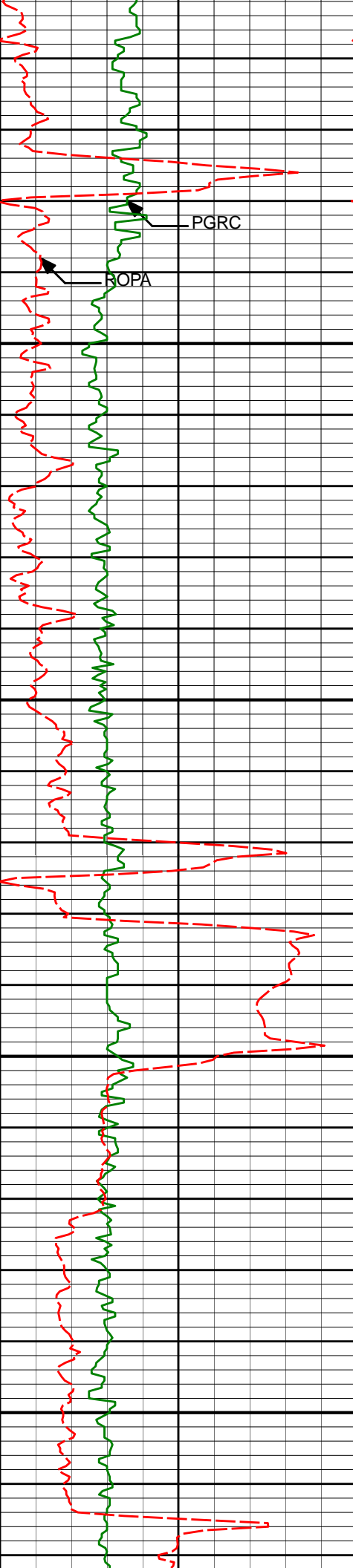
17.99°

68.96°

3910.86'

-285.19'

4050



PGRC

BOPA

4100

4150

4200

4250

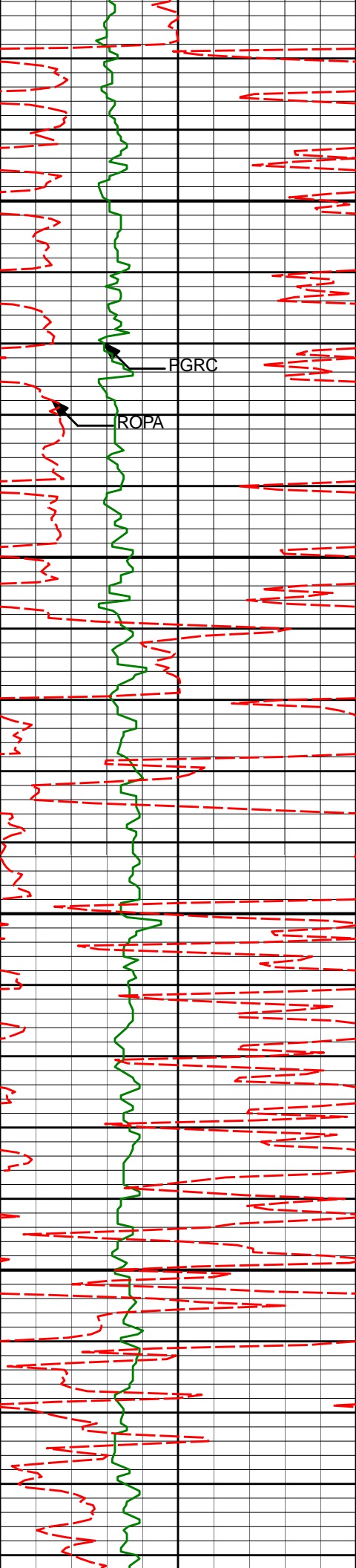
4218'

20.76°

69.87°

4090.08'

-307.32'



4300

4313'

21.38°

70.88°

4178.73'

-318.78'

FGRC

ROPA

4350

4400

4408'

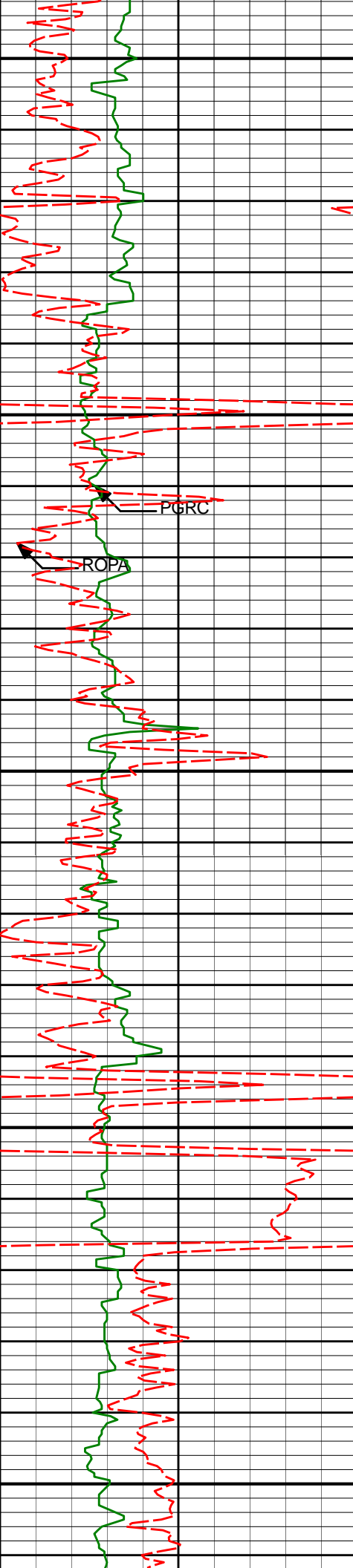
20.52°

71.16°

4267.45'

-329.83'

4450



4500

4504'

18.94°

70.51°

4357.81'

-340.46'

4550

4600

4599'

18.27°

70.56°

4447.84'

-350.56'

4650

4700

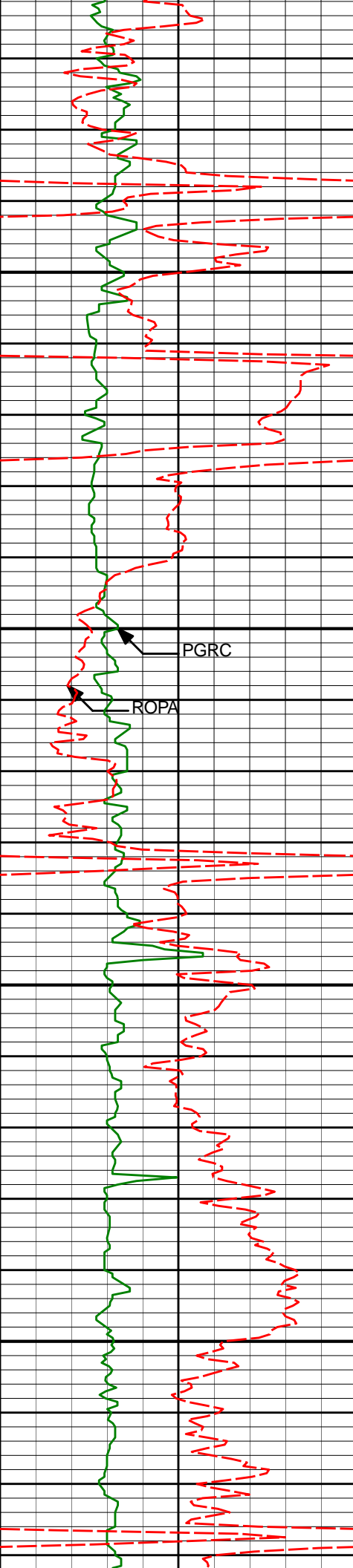
4694'

16.14°

69.19°

4538.59'

-360.21'



4750

4800

4850

4900

PGRC

ROPA

4789'

13.73°

67.34°

4630.37'

-369.25'

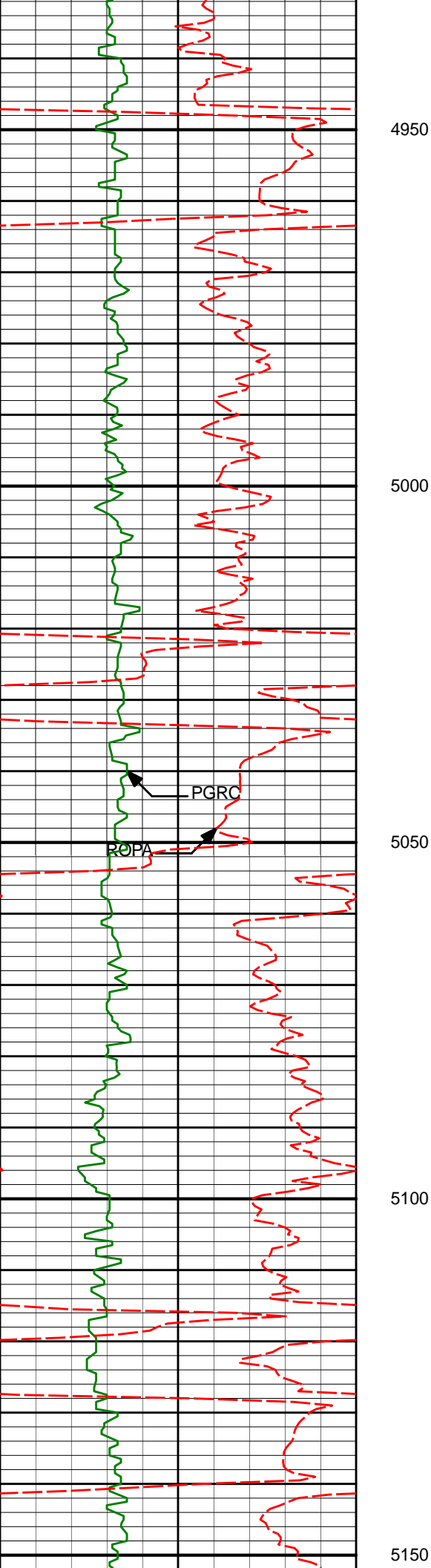
4884'

13.61°

67.12°

4722.68'

-377.94'



4979'

11.73°

68.25°

4815.36'

-385.86'

5000

5050

5073'

8.08°

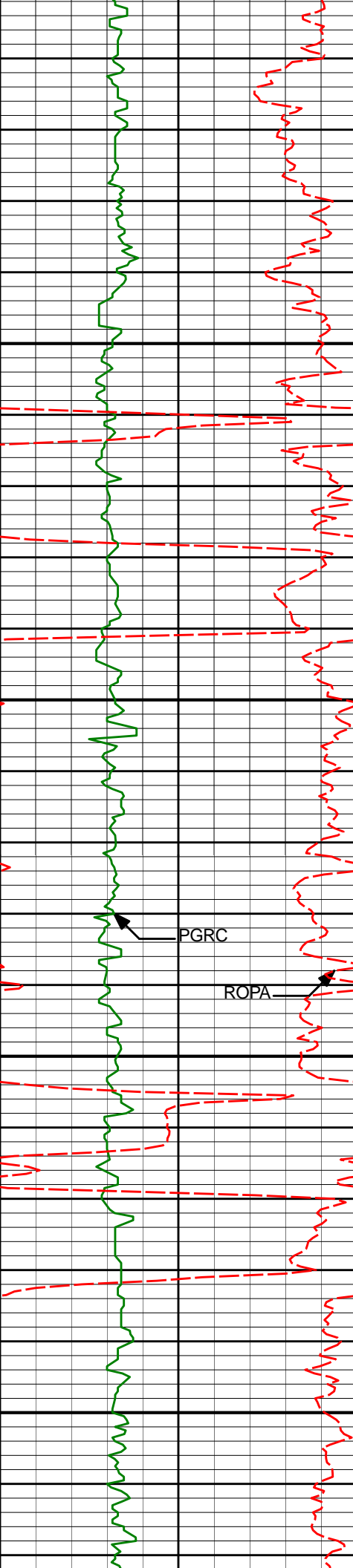
65.52°

4907.95'

-392.14'

5100

5150



5200

5250

5300

5350

5168'

6.57°

59.93°

5002.17'

-397.63'

5263'

5.01°

63.33°

5096.68'

-402.22'

PGRC

ROPA

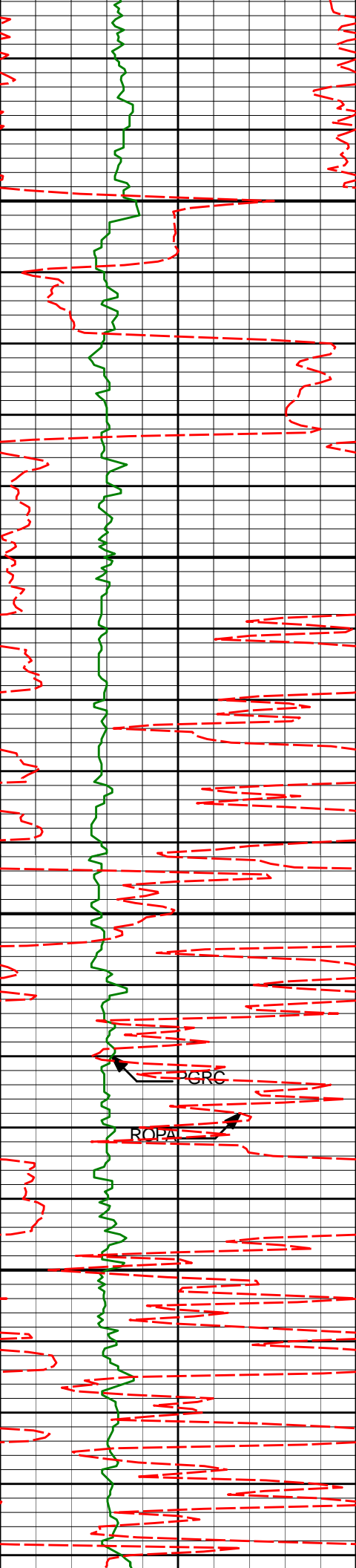
5358'

3.53°

74.79°

5191.42'

-404.85'



5400

5450

5500

5550

5453'

1.55°

65.50°

5286.32'

-406.15'

PCRC

ROPAL

5548'

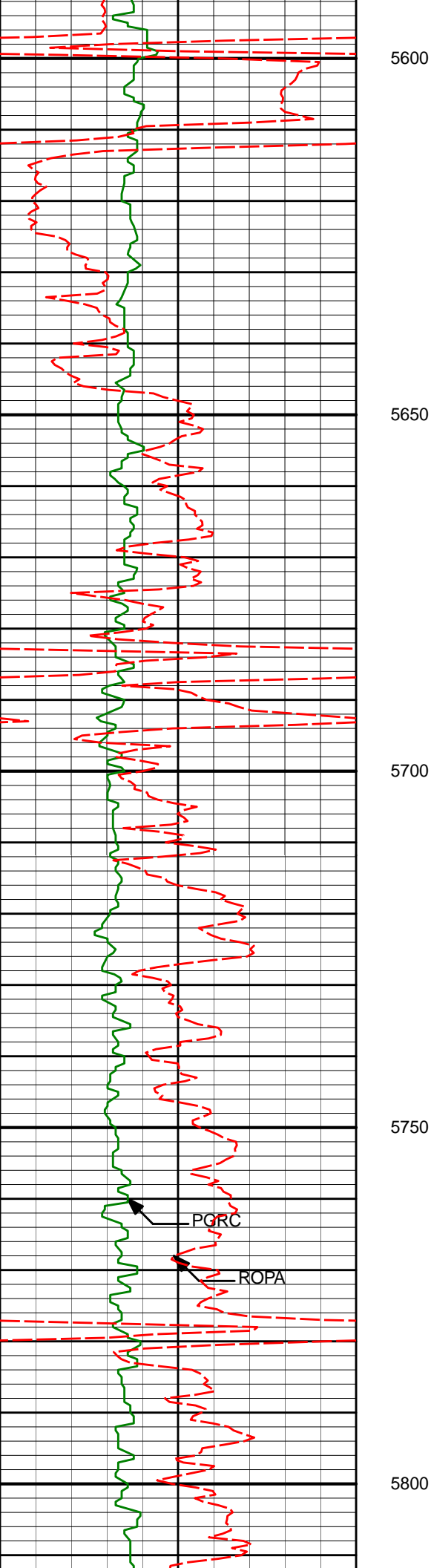
1.42°

59.68°

5381.29'

-407.27'





5600

5643'

0.47°

357.36°

5476.28'

-408.26'

5650

5700

5738'

0.57°

289.54°

5571.27'

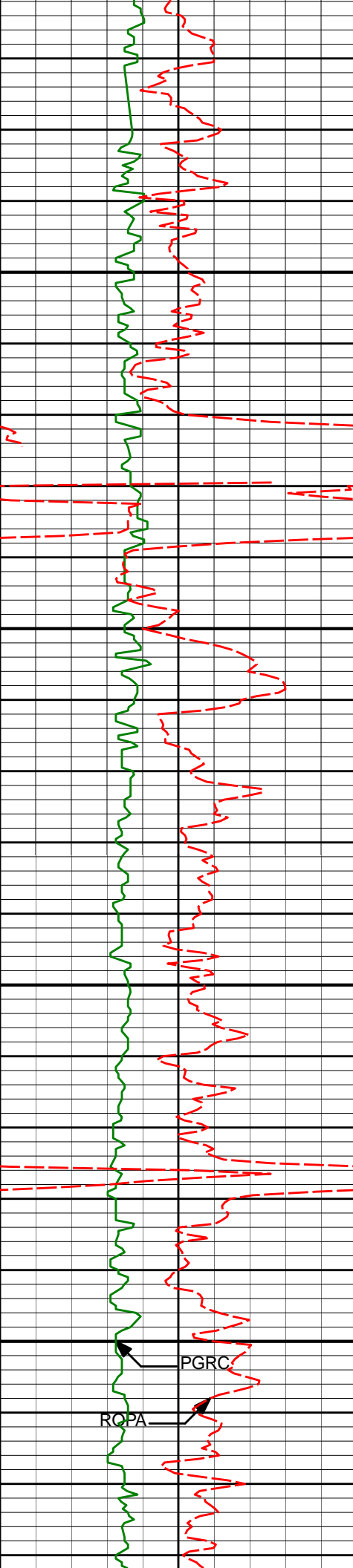
-408.80'

5750

PGRC

ROPA

5800



5850

5900

5950

6000

PGRC

RCPA

5834'

0.68°

275.21°

5667.27'

-409.02'

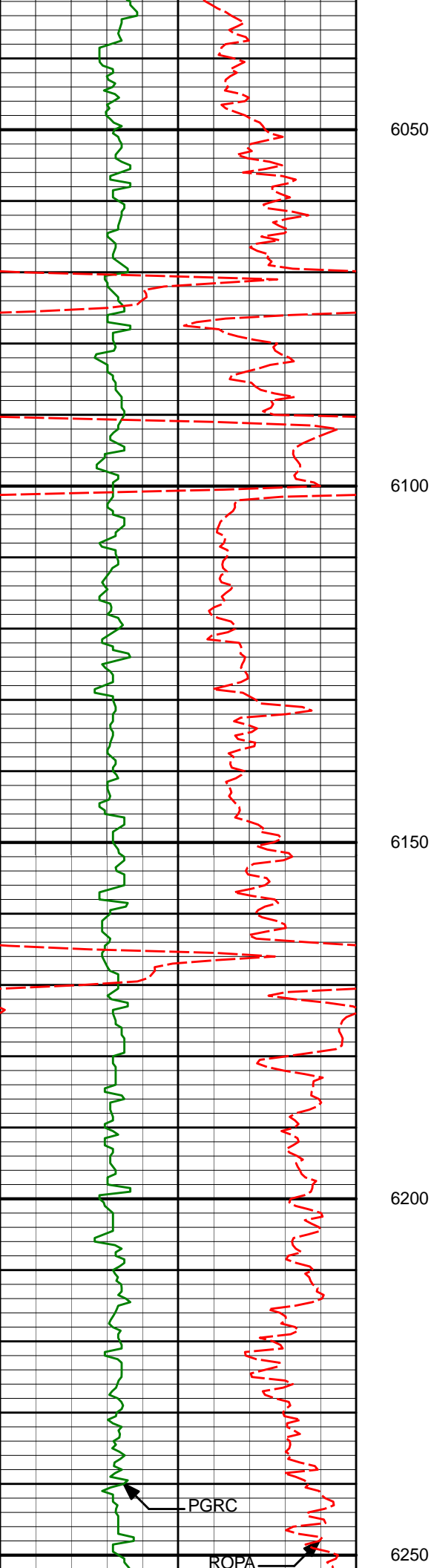
6024'

1.22°

267.94°

5857.24'

-409.05'



6119'

0.51°

250.95°

5952.23'

-408.87'

6214'

0.99°

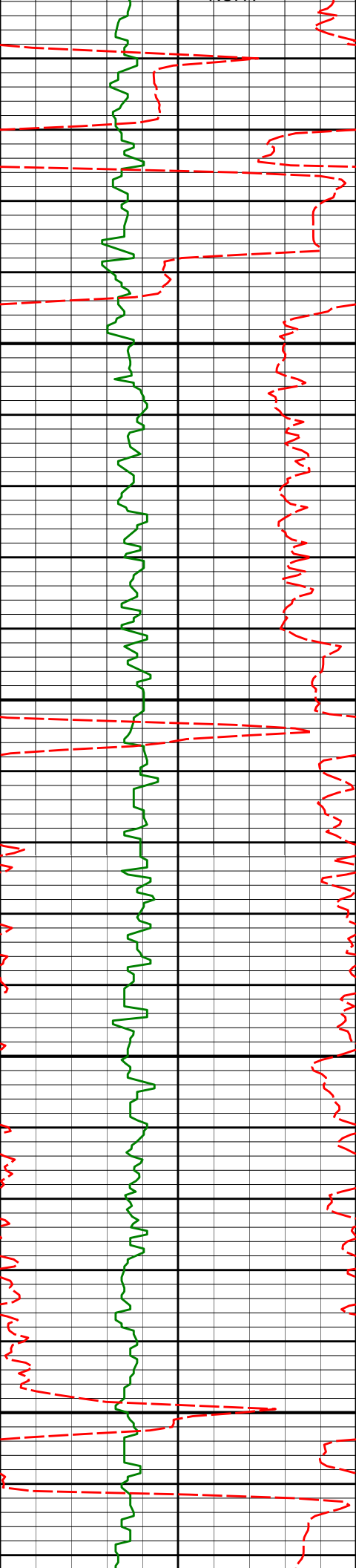
267.62°

6047.22'

-408.70'

PGRC

ROPA



6300

6309'

0.97°

169.02°

6142.21'

-407.88'

6350

6400

6405'

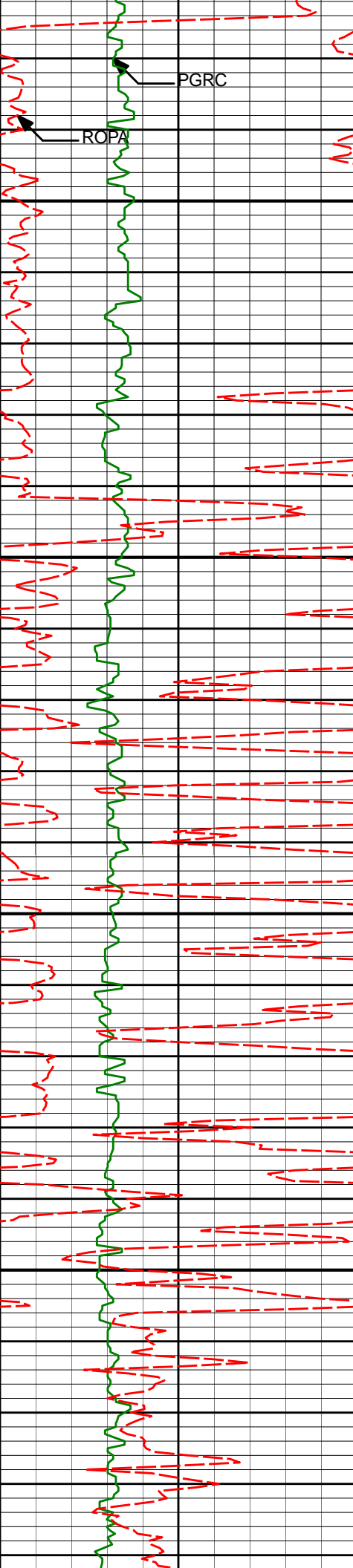
1.43°

178.39°

6238.19'

-405.88'

6450



6500

6500'

0.35°

122.34°

6333.18'

-404.54'

6550

6600

6595'

0.58°

177.71°

6428.18'

-403.90'

6650

6690'

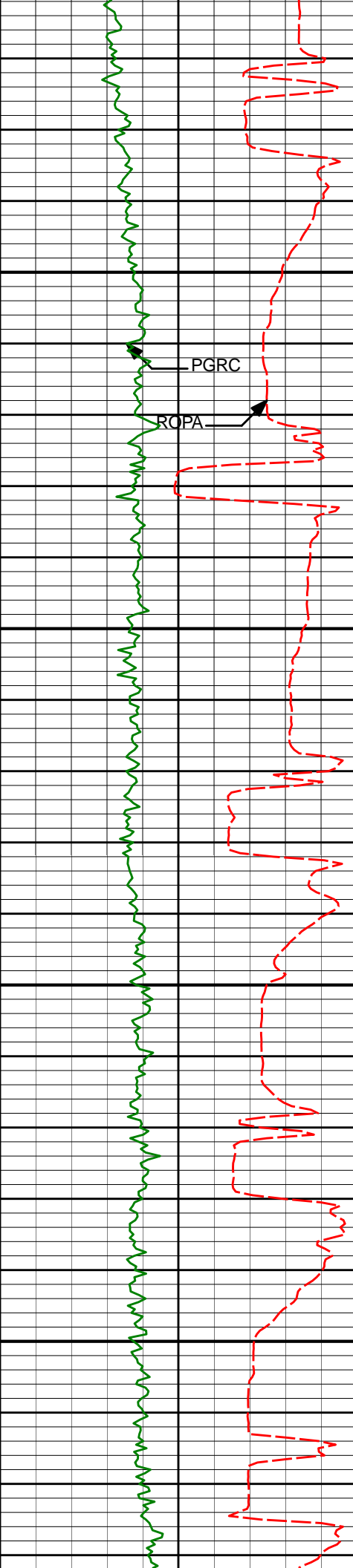
0.96°

205.73°

6523.17'

-402.71'





6950

7000

7050

7100

6928'

13.97°

186.83°

6759.51'

-380.49'

6975'

18.15°

192.19°

6804.67'

-367.70'

7023'

22.35°

190.91°

6849.69'

-351.42'

7070'

26.18°

190.32°

6892.53'

-332.44'

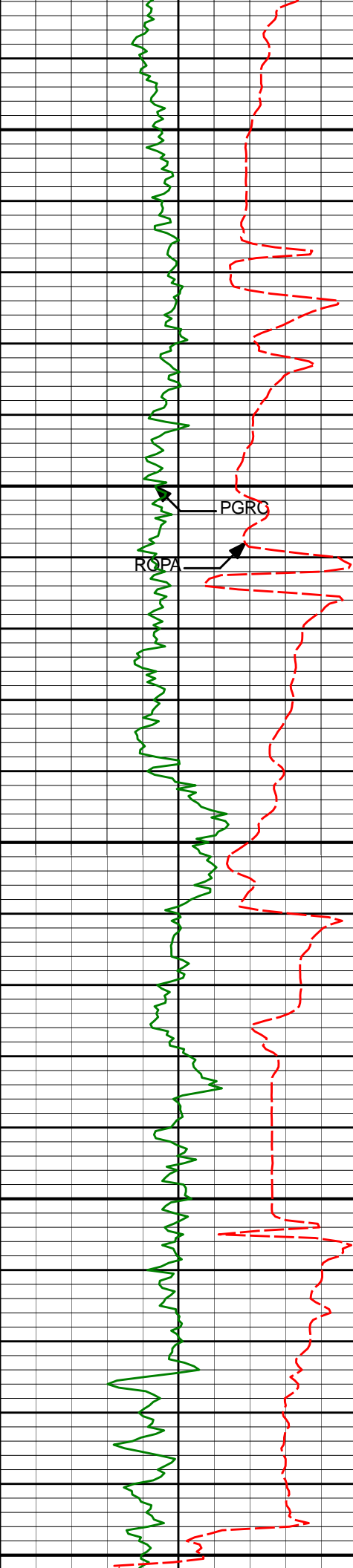
7118'

28.56°

192.13°

6935.15'

-310.80'



7150

7165'

33.75°

189.85°

6975.36'

-286.94'

7200

PGRC

ROPA

7213'

37.52°

187.75°

7014.37'

-259.31'

7250

7260'

44.35°

185.84°

7049.86'

-228.74'

7300

7307'

49.81°

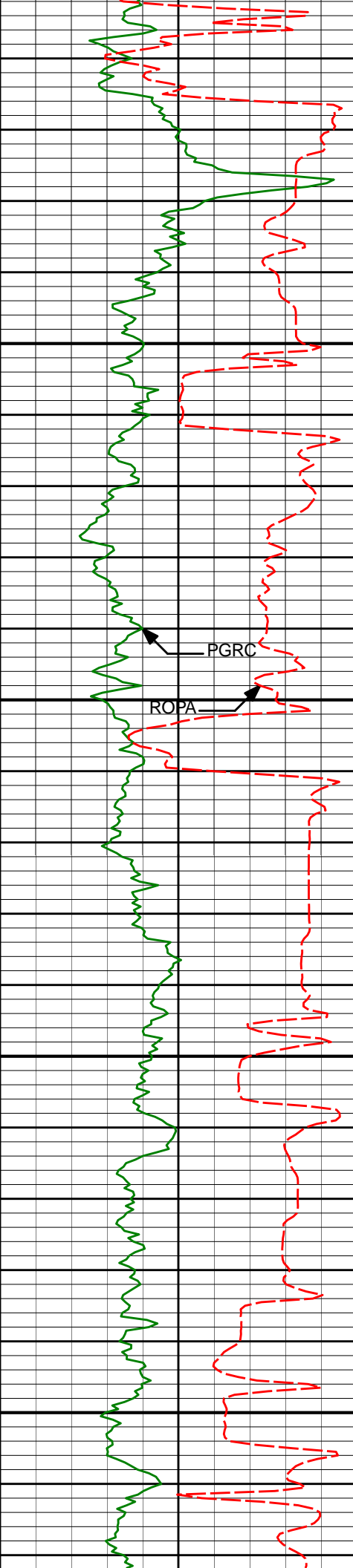
181.58°

7081.86'

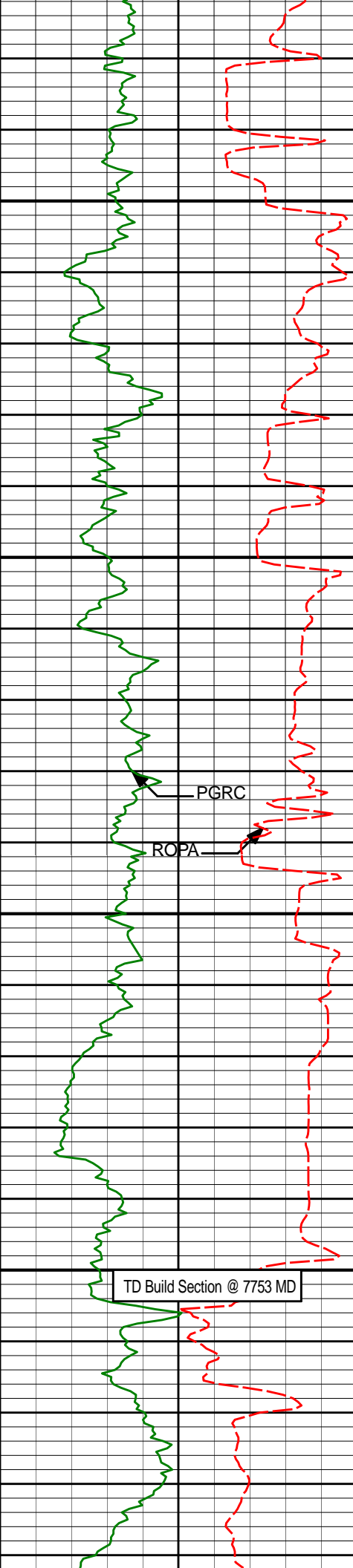
-194.42'

7350

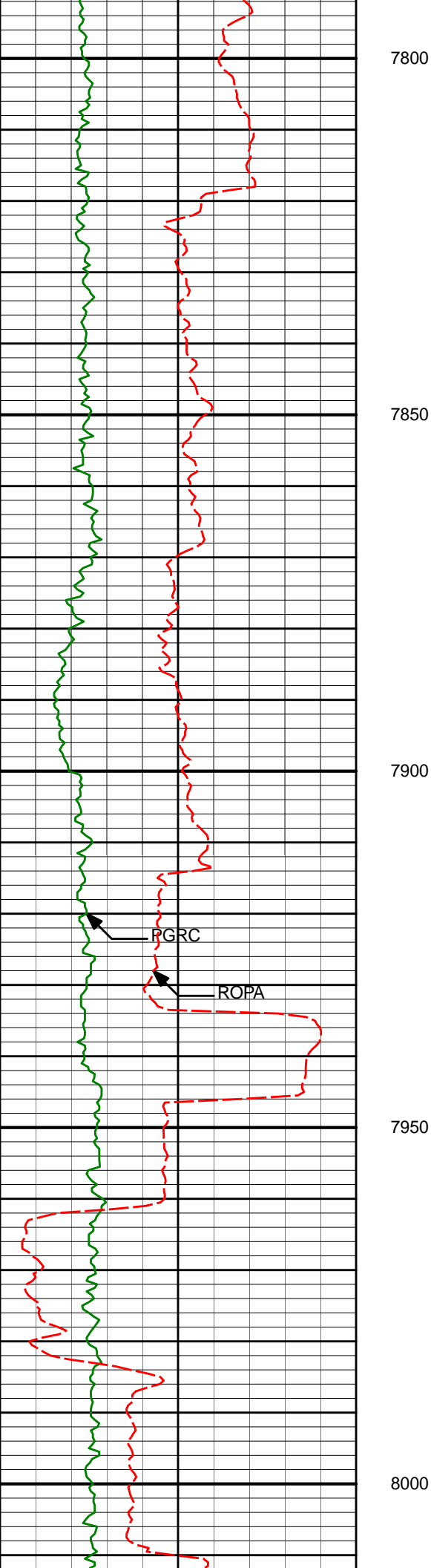




	7355'	54.05°	179.37°	7111.45'	-156.65'
7400	7403'	58.50°	175.41°	7138.10'	-116.79'
7450	7450'	63.76°	176.04°	7160.79'	-75.76'
7500	7498'	69.11°	177.64°	7179.97'	-31.85'
7550	7546'	72.86°	178.10°	7195.61'	13.49'



7594'	76.58°	177.45°	7208.26'	59.75'
7600				
7641'	79.11°	177.87°	7218.15'	105.66'
7650				
7706'	85.12°	179.97°	7227.06'	170.00'
7700				
7750				
7777'	90.31°	178.82°	7229.90'	240.91'



7872'

89.82°

178.08°

7229.79'

335.88'

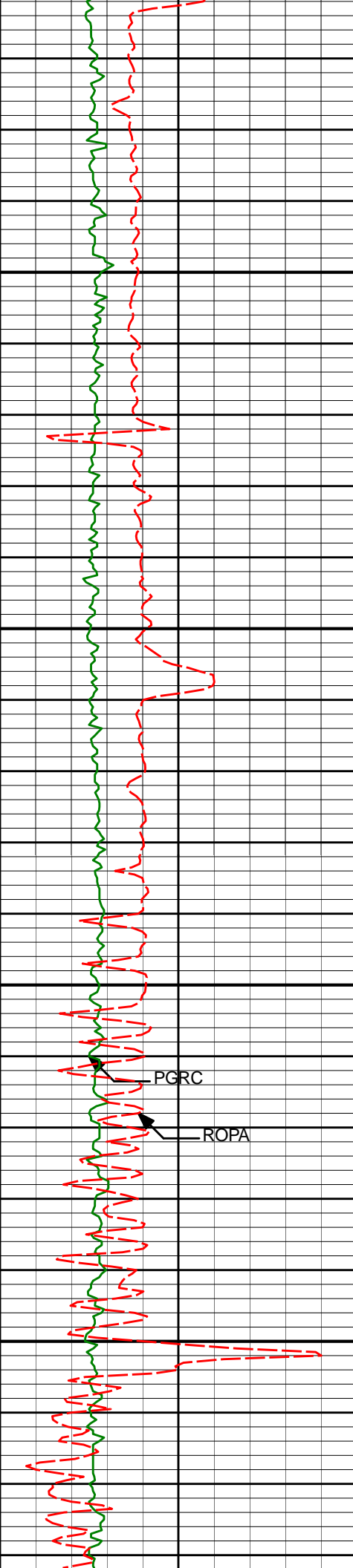
7967'

91.17°

178.60°

7228.97'

430.83'



8050

8062'

91.05°

179.58°

7227.13'

525.80'

8100

8150

8157'

91.48°

179.93°

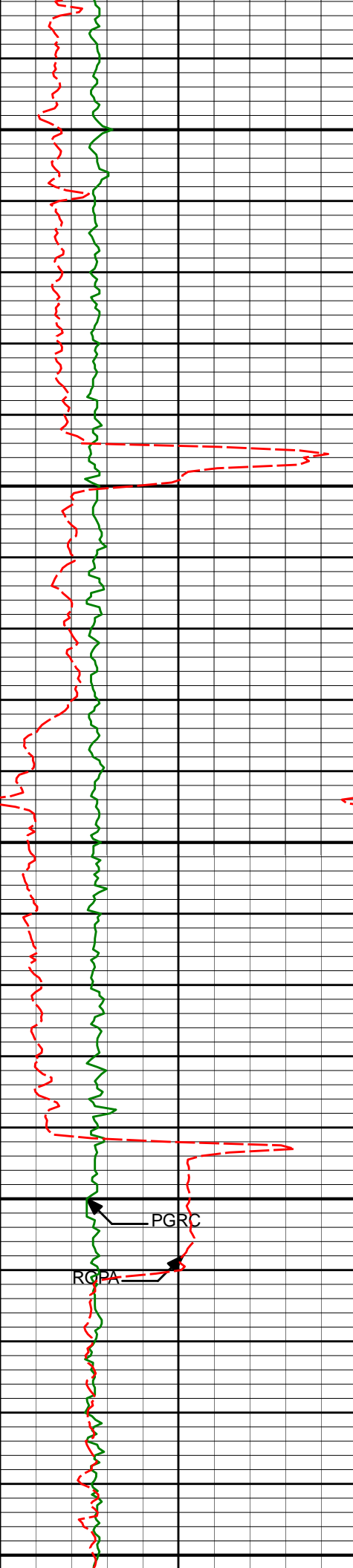
7225.03'

620.77'

PGRC

ROPA

8200



8250

8253'

91.54°

180.24°

7222.50'

716.74'

8300

8350

8348'

91.11°

180.18°

7220.30'

811.72'

8400

PGRC

RGPA

8450

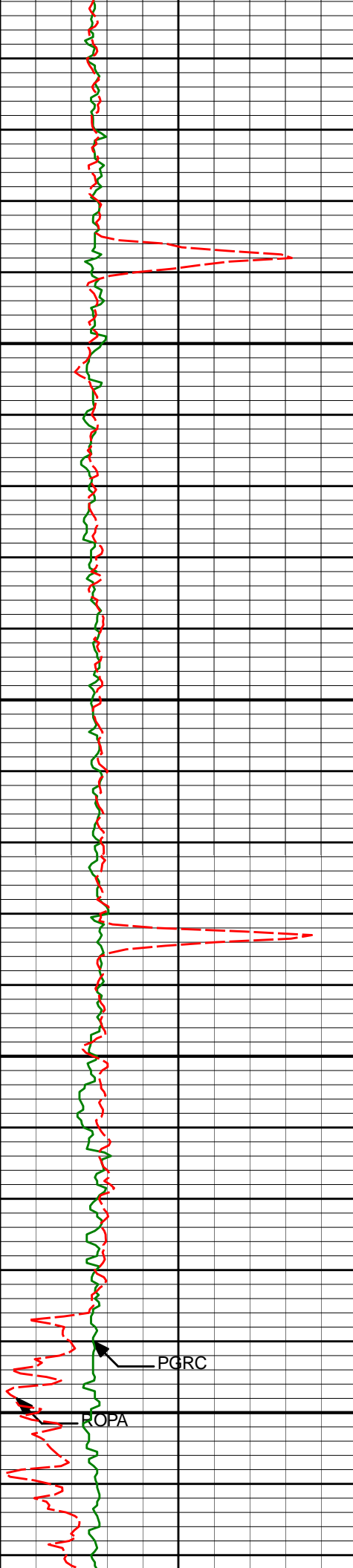
8443'

91.42°

180.63°

7218.21'

906.69'



8500

8538'

90.98°

180.34°

7216.22'

1001.66'

8550

8600

8633'

90.74°

180.67°

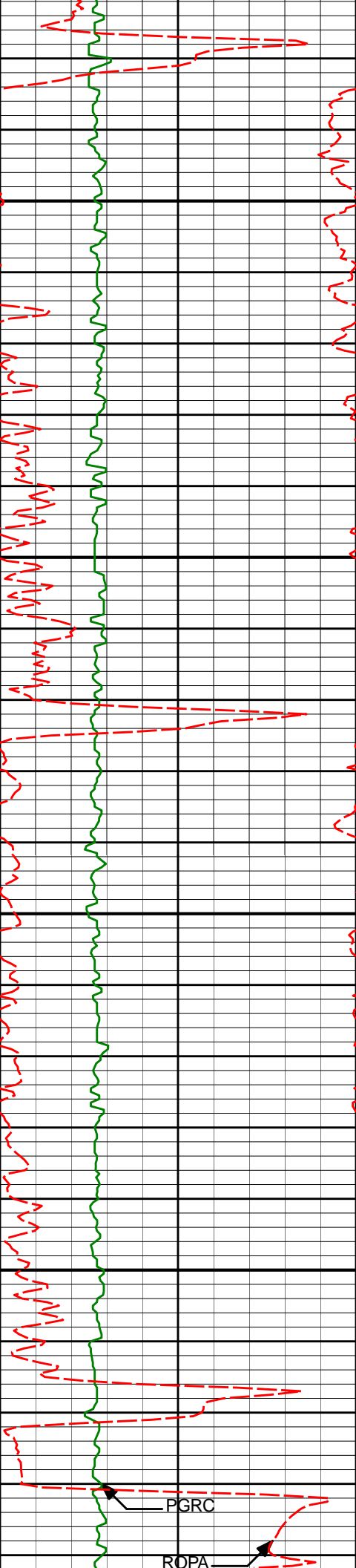
7214.79'

1096.65'

8650

PGRC

ROPA



8700

8728'

90.55°

180.72°

7213.72'

1191.64'

8750

8800

8823'

90.12°

181.13°

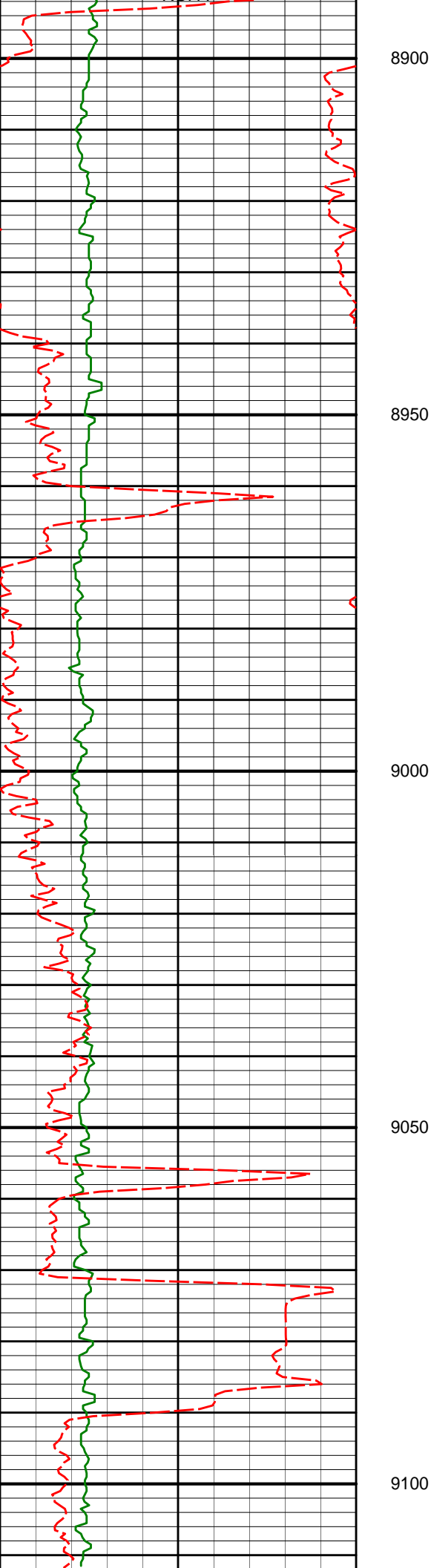
7213.17'

1286.62'

8850

PGRC

ROPA



8919'

91.11°

181.09°

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1382.60'

9109'

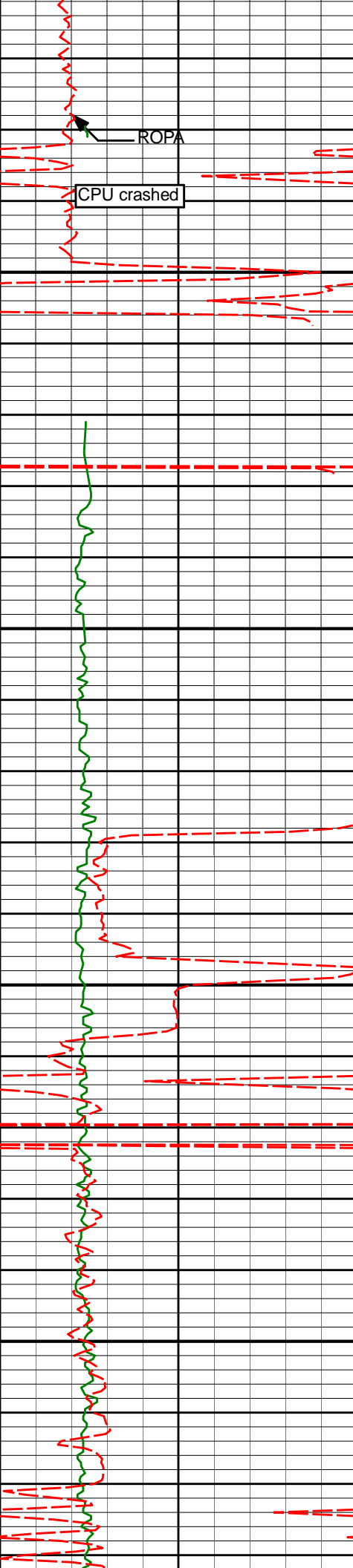
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1572.54'





9150

9200

9250

9300

9204'

90.65°

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1667.52'

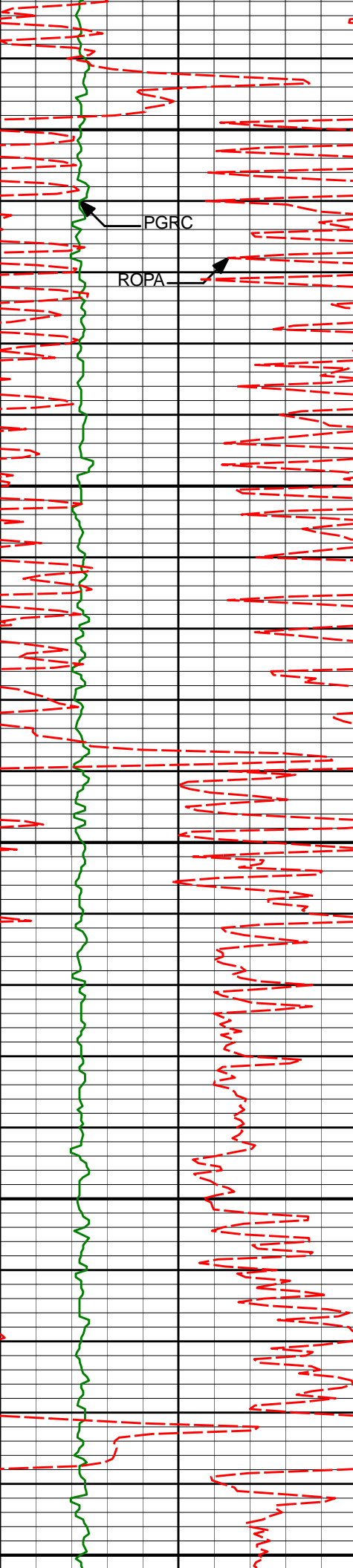
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89.91°

179.79°

7207.15'

1762.52'



9350

PGRC

ROPA

9400

9450

9500

9550

9394'

90.52°

180.78°

7206.80'

1857.52'

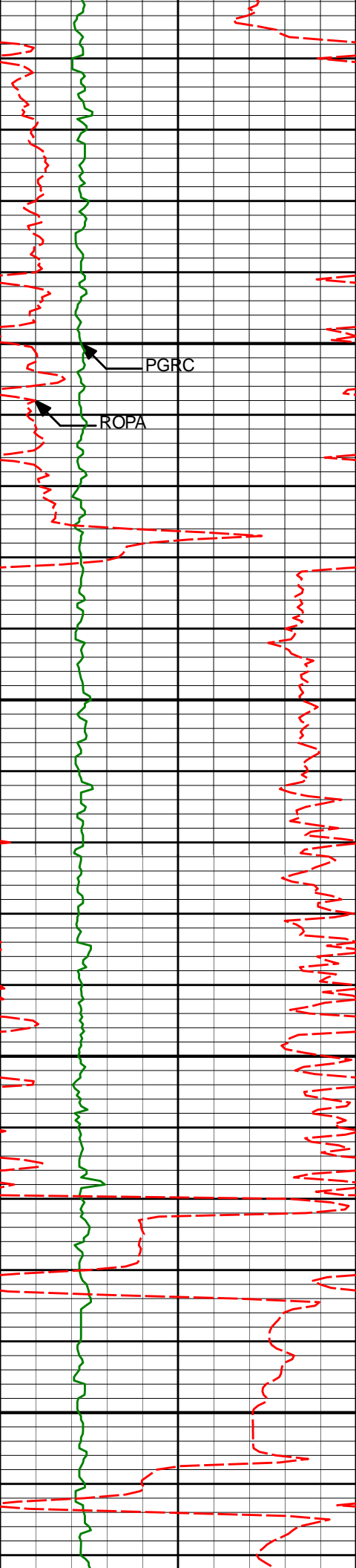
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1952.48'



9585'

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2048.38'

9600

PGRC

ROPA

9650

9680'

90.22°

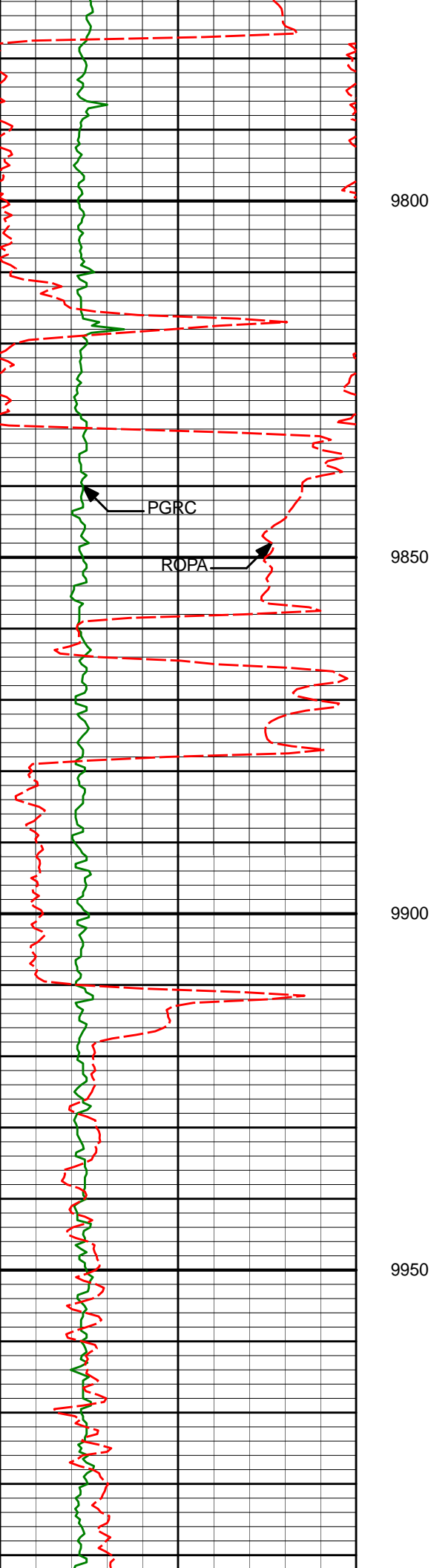
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9700

9750



9775'

90.06°

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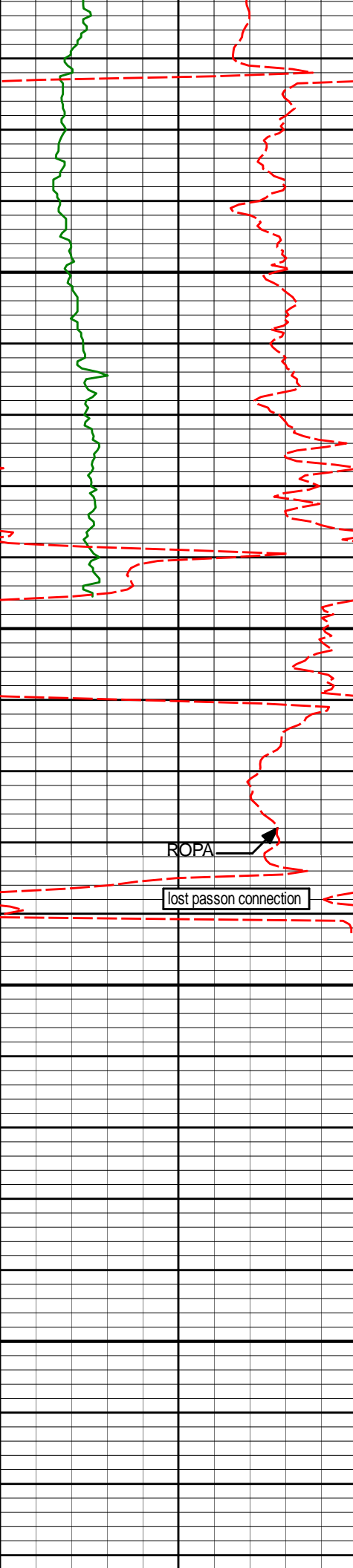
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10250

10251'

92.32°

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2713.64'

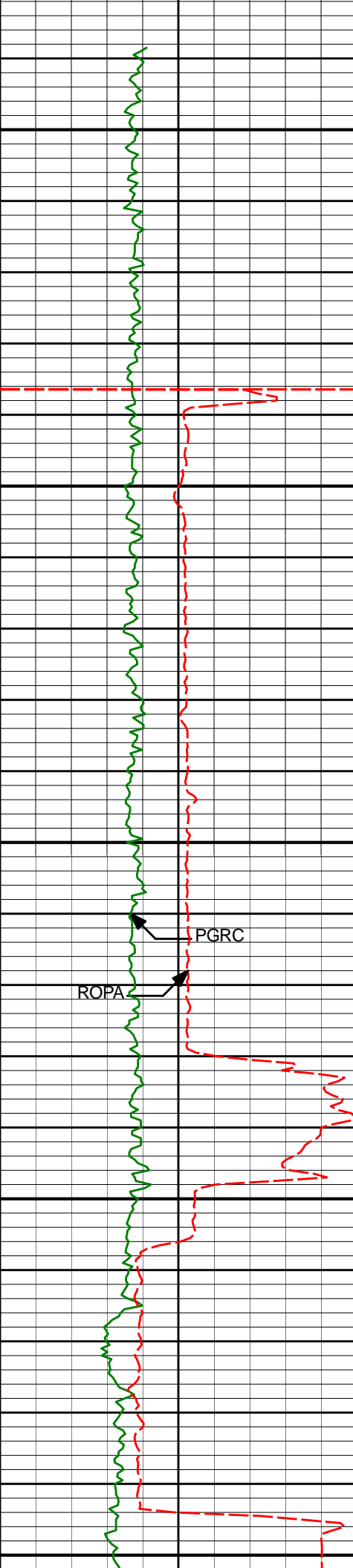
10300

ROPA

lost passon connection

10350

10400



10441'

90.34°

175.84°

7197.20'

2903.41'

10450

10500

10536'

90.56°

173.66°

7196.45'

2998.01'

10550

PGRC

ROPA

10600

10631'

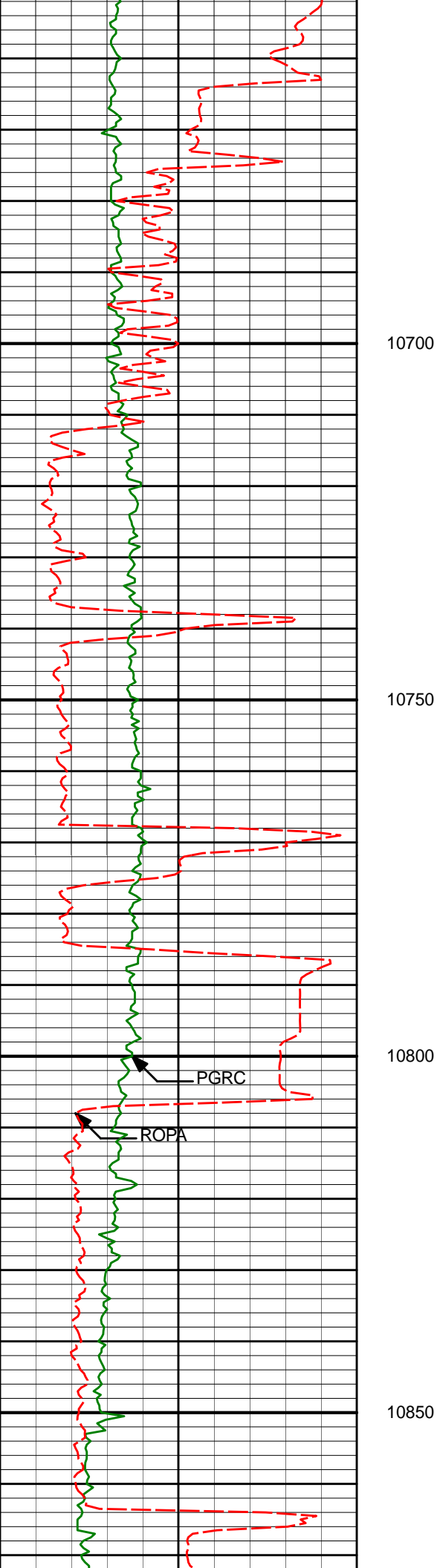
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3092.41'

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10726'

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10822'

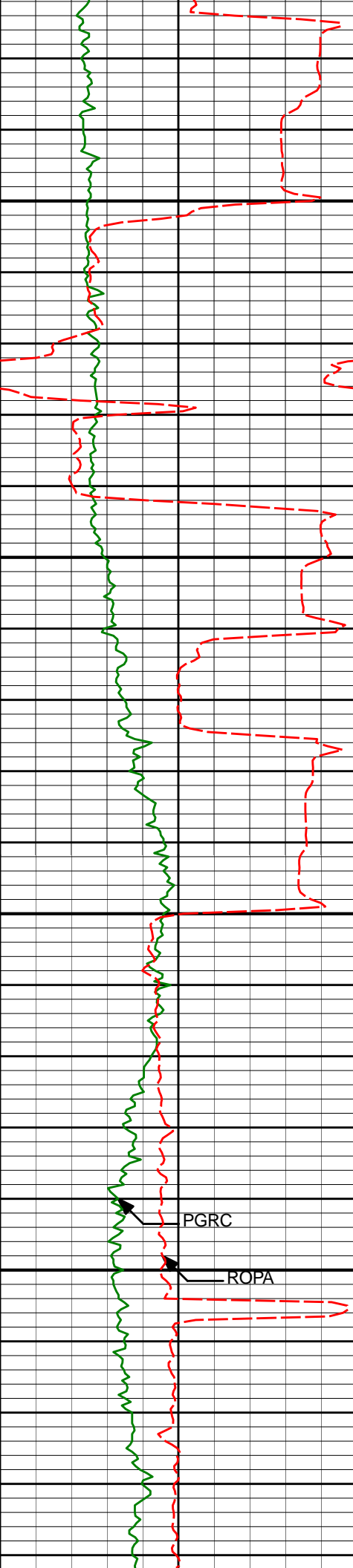
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7195.49'

3282.64'





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10917'

90.43°

178.21°

7195.52'

3377.49'

10950

11000

11012'

91.48°

182.24°

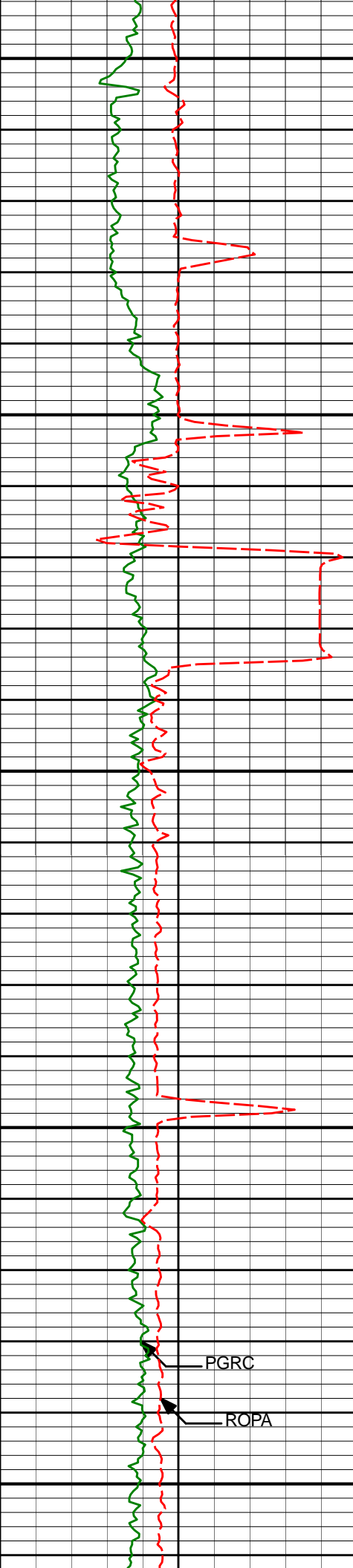
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3472.46'

PGRC

ROPA

11050



11100

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92.06°

181.31°

7191.00'

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11202'

90.96°

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3662.30'

11250

PGRC

ROPA

11300

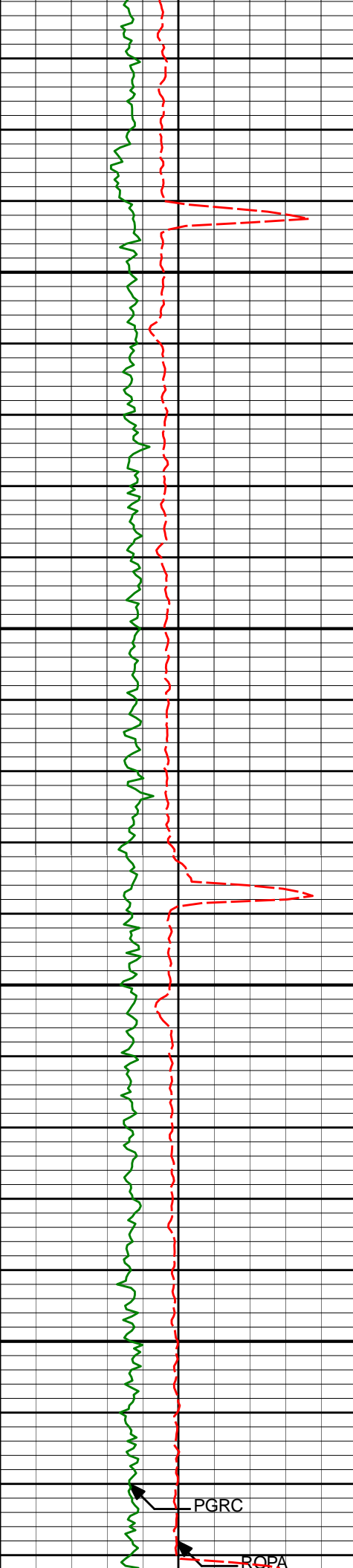
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181.15°

7187.32'

3757.27'



11350

11400

11450

11500

11392'

89.88°

181.17°

7187.04'

3852.25'

11487'

90.09°

180.52°

7187.06'

3947.24'

PGRC

POPA



11550

11600

11650

11700

11750

11582'

90.25°

182.14°

7186.78'

4042.21'

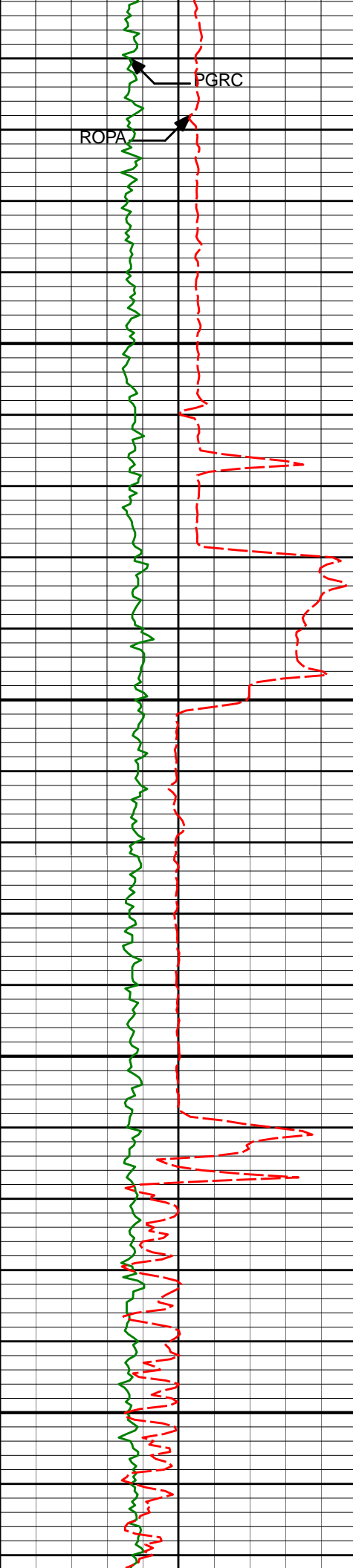
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90.25°

182.56°

7186.36'

4137.13'



11800

11850

11900

11950

11772'

90.28°

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7185.92'

4232.01'

11867'

90.49°

181.17°

7185.29'

4326.94'

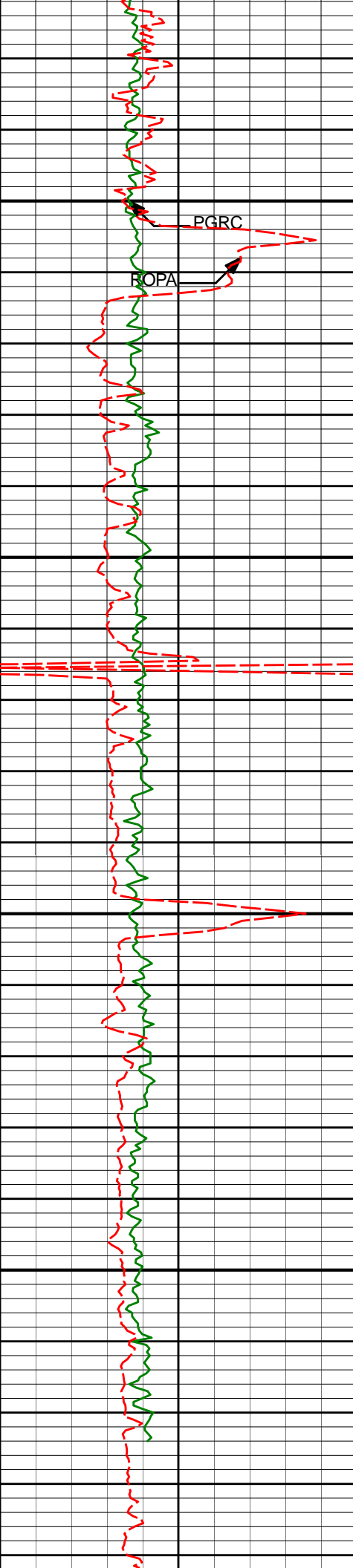
11962'

89.78°

181.10°

7185.06'

4421.92'



12000

PGRC

BOPA

12050

12057'

89.47°

180.97°

7185.68'

4516.90'

12100

12150

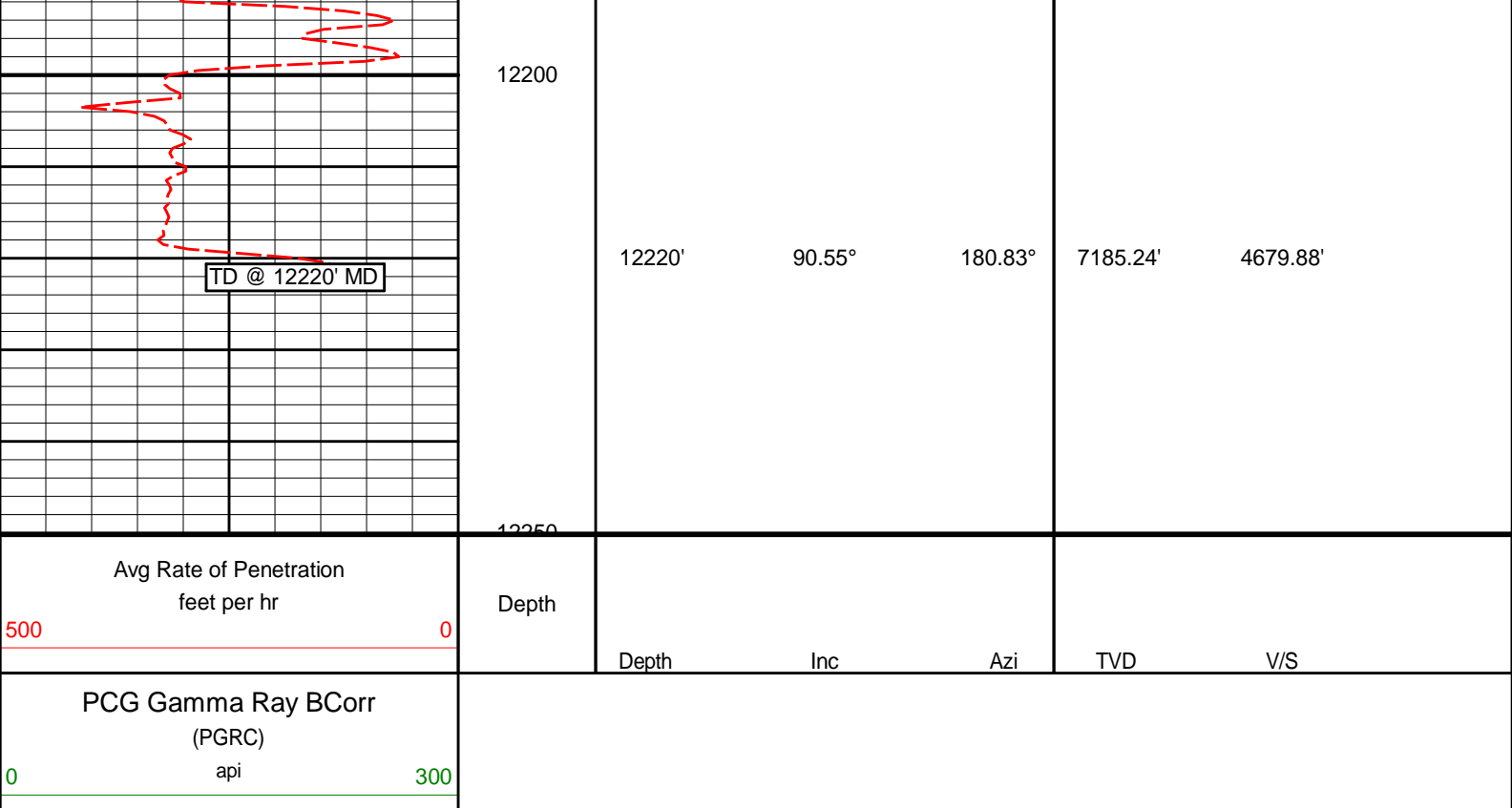
12176'

90.55°

180.83°

7185.66'

4635.89'



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation  
Morning Fresh 36N-22HZR  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901536109

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
142.00	0.11	307.08	142.00	0.08 N	0.11 W	-0.08	0.08
329.00	0.37	78.88	329.00	0.31 N	0.34 E	-0.31	0.24
451.00	0.25	99.98	451.00	0.34 N	0.99 E	-0.34	0.13
544.00	0.25	105.64	544.00	0.25 N	1.38 E	-0.25	0.03
638.00	0.22	69.44	638.00	0.25 N	1.75 E	-0.25	0.16
731.00	0.25	50.99	730.99	0.45 N	2.08 E	-0.45	0.09
940.00	0.17	30.18	939.99	1.00 N	2.59 E	-1.00	0.05
1033.00	0.52	337.43	1032.99	1.51 N	2.49 E	-1.51	0.47
1098.00	0.48	333.34	1097.99	2.03 N	2.26 E	-2.03	0.08
1192.00	0.51	0.43	1191.99	2.80 N	2.08 E	-2.80	0.25
1287.00	1.52	56.77	1286.97	3.91 N	3.14 E	-3.91	1.38
1381.00	4.27	65.48	1380.84	6.04 N	7.37 E	-6.04	2.95
1475.00	5.68	66.65	1474.49	9.34 N	14.82 E	-9.34	1.50
1569.00	7.44	69.99	1567.87	13.27 N	24.81 E	-13.27	1.92
1663.00	8.25	69.03	1660.99	17.76 N	36.83 E	-17.76	0.87
1851.00	12.44	76.12	1845.90	27.45 N	69.10 E	-27.45	2.33
1946.00	13.62	75.55	1938.45	32.70 N	89.86 E	-32.70	1.25
2040.00	15.12	75.61	2029.51	38.51 N	112.46 E	-38.51	1.60
2134.00	17.01	71.44	2119.83	45.93 N	137.37 E	-45.93	2.35
2228.00	18.24	69.49	2209.42	55.46 N	164.18 E	-55.46	1.45
2323.00	19.84	68.03	2299.22	66.70 N	193.06 E	-66.70	1.76
2416.00	18.83	69.49	2386.97	77.87 N	221.76 E	-77.87	1.20
2511.00	20.04	67.67	2476.56	89.42 N	251.17 E	-89.42	1.42
2605.00	19.30	68.76	2565.08	101.17 N	280.55 E	-101.17	0.88
2699.00	20.60	65.07	2653.44	113.77 N	310.03 E	-113.77	1.92

2793.00	20.84	65.22	2741.36	127.75 N	340.20 E	-127.75	0.26
2887.00	20.95	65.71	2829.17	141.67 N	370.70 E	-141.67	0.22
2983.00	21.33	65.79	2918.71	155.89 N	402.27 E	-155.89	0.40
3077.00	20.13	68.98	3006.63	168.70 N	432.96 E	-168.70	1.75
3172.00	19.11	68.38	3096.11	180.30 N	462.68 E	-180.30	1.09
3267.00	18.73	69.62	3185.98	191.34 N	491.43 E	-191.34	0.58
3363.00	17.81	68.26	3277.14	202.14 N	519.52 E	-202.14	1.06
3458.00	18.03	63.94	3367.54	213.98 N	546.22 E	-213.98	1.42
3553.00	16.68	62.87	3458.21	226.66 N	571.57 E	-226.66	1.46
3648.00	17.51	65.86	3549.01	238.72 N	596.74 E	-238.72	1.27
3743.00	19.09	65.94	3639.20	250.90 N	623.97 E	-250.90	1.66
3838.00	16.80	64.06	3729.58	263.24 N	650.51 E	-263.24	2.49
3933.00	17.46	68.01	3820.37	274.59 N	676.07 E	-274.58	1.41
4028.00	17.99	68.96	3910.86	285.19 N	702.98 E	-285.19	0.64
4218.00	20.76	69.87	4090.08	307.32 N	761.99 E	-307.32	1.47
4313.00	21.38	70.88	4178.73	318.78 N	794.16 E	-318.78	0.76
4408.00	20.52	71.16	4267.45	329.83 N	826.28 E	-329.83	0.91
4504.00	18.94	70.51	4357.81	340.46 N	856.89 E	-340.46	1.66
4599.00	18.27	70.56	4447.84	350.56 N	885.47 E	-350.56	0.71
4694.00	16.14	69.19	4538.59	360.21 N	911.86 E	-360.21	2.28
4789.00	13.73	67.34	4630.37	369.25 N	934.61 E	-369.25	2.59
4884.00	13.61	67.12	4722.68	377.94 N	955.31 E	-377.94	0.14
4979.00	11.73	68.25	4815.36	385.86 N	974.58 E	-385.86	2.00
5073.00	8.08	65.52	4907.95	392.14 N	989.47 E	-392.14	3.91
5168.00	6.57	59.93	5002.17	397.63 N	1000.25 E	-397.63	1.76
5263.00	5.01	63.33	5096.68	402.22 N	1008.66 E	-402.22	1.68
5358.00	3.53	74.79	5191.42	404.85 N	1015.19 E	-404.85	1.79
5453.00	1.55	65.50	5286.32	406.15 N	1019.18 E	-406.15	2.12
5548.00	1.42	59.68	5381.29	407.27 N	1021.37 E	-407.27	0.21
5643.00	0.47	357.36	5476.28	408.26 N	1022.36 E	-408.26	1.34
5738.00	0.57	289.54	5571.27	408.80 N	1021.90 E	-408.80	0.62
5834.00	0.68	275.21	5667.27	409.02 N	1020.88 E	-409.02	0.20
6024.00	1.22	267.94	5857.24	409.05 N	1017.74 E	-409.05	0.29
6119.00	0.51	250.95	5952.23	408.87 N	1016.33 E	-408.87	0.79
6214.00	0.99	267.62	6047.22	408.70 N	1015.11 E	-408.70	0.55
6309.00	0.97	169.02	6142.21	407.88 N	1014.44 E	-407.88	1.56
6405.00	1.43	178.39	6238.19	405.88 N	1014.63 E	-405.88	0.52
6500.00	0.35	122.34	6333.18	404.54 N	1014.91 E	-404.54	1.33
6595.00	0.58	177.71	6428.18	403.90 N	1015.17 E	-403.90	0.50
6690.00	0.96	205.73	6523.17	402.71 N	1014.85 E	-402.71	0.55
6785.00	2.29	194.79	6618.13	400.16 N	1014.02 E	-400.15	1.43
6833.00	6.21	188.14	6665.99	396.66 N	1013.41 E	-396.66	8.22
6880.00	9.61	185.90	6712.53	390.24 N	1012.64 E	-390.24	7.26
6928.00	13.97	186.83	6759.51	380.49 N	1011.54 E	-380.49	9.09
6975.00	18.15	192.19	6804.67	367.70 N	1009.32 E	-367.70	9.43
7023.00	22.35	190.91	6849.69	351.42 N	1006.01 E	-351.42	8.80
7070.00	26.18	190.32	6892.53	332.44 N	1002.46 E	-332.44	8.17
7118.00	28.56	192.13	6935.15	310.80 N	998.15 E	-310.80	5.25
7165.00	33.75	189.85	6975.36	286.94 N	993.56 E	-286.94	11.32
7213.00	37.52	187.75	7014.37	259.31 N	989.30 E	-259.31	8.26
7260.00	44.35	185.84	7049.86	228.74 N	985.70 E	-228.74	14.77
7307.00	49.81	181.58	7081.86	194.42 N	983.53 E	-194.42	13.37
7355.00	54.05	179.37	7111.45	156.65 N	983.23 E	-156.65	9.55
7403.00	58.50	175.41	7138.10	116.79 N	985.09 E	-116.79	11.53
7450.00	63.76	176.04	7160.79	75.76 N	988.15 E	-75.76	11.25
7498.00	69.11	177.64	7179.97	31.85 N	990.56 E	-31.85	11.56
7546.00	72.86	178.10	7195.61	13.49 S	992.25 E	13.49	7.86
7594.00	76.58	177.45	7208.26	59.75 S	994.04 E	59.75	7.86
7641.00	79.11	177.87	7218.15	105.66 S	995.92 E	105.66	5.45
7706.00	85.12	179.97	7227.06	170.00 S	997.12 E	170.00	9.78
7777.00	90.31	178.82	7229.90	240.91 S	997.87 E	240.91	7.49
7872.00	89.82	178.08	7229.79	335.88 S	1000.44 E	335.88	0.93
7967.00	91.17	178.60	7228.97	430.83 S	1003.20 E	430.83	1.52
8062.00	91.05	179.58	7227.13	525.80 S	1004.70 E	525.80	1.04
8157.00	91.48	179.93	7225.03	620.77 S	1005.11 E	620.77	0.58
8253.00	91.54	180.24	7222.50	716.74 S	1004.97 E	716.74	0.33
8348.00	91.11	180.18	7220.30	811.71 S	1004.62 E	811.72	0.46
8443.00	91.42	180.63	7218.21	906.69 S	1003.95 E	906.69	0.58
8538.00	90.98	180.34	7216.22	1001.66 S	1003.15 E	1001.66	0.55
8633.00	90.74	180.67	7214.79	1096.65 S	1002.31 E	1096.65	0.43
8728.00	90.55	180.72	7213.72	1191.64 S	1001.16 E	1191.64	0.21
8823.00	90.12	181.13	7213.17	1286.62 S	999.62 E	1286.62	0.63
8919.00	91.11	181.09	7212.13	1382.60 S	997.76 E	1382.60	1.03
9109.00	90.86	180.94	7208.87	1572.54 S	994.40 E	1572.54	0.15
9204.00	92.87	182.22	7207.22	1667.52 S	992.42 E	1667.52	0.22



9204.00	90.65	180.63	7207.62	1667.52 S	993.10 E	1667.52	0.39
9299.00	89.91	179.79	7207.15	1762.52 S	992.75 E	1762.52	1.18
9394.00	90.52	180.78	7206.80	1857.52 S	992.28 E	1857.52	1.22
9489.00	90.43	181.89	7206.01	1952.48 S	990.06 E	1952.48	1.17
9585.00	90.31	183.47	7205.39	2048.37 S	985.57 E	2048.38	1.65
9680.00	90.22	185.47	7204.95	2143.08 S	978.17 E	2143.08	2.11
9775.00	90.06	183.41	7204.72	2237.79 S	970.82 E	2237.79	2.17
9965.00	90.22	180.20	7204.25	2427.67 S	964.83 E	2427.67	1.69
10060.00	90.25	179.90	7203.86	2522.67 S	964.75 E	2522.67	0.32
10155.00	90.06	180.01	7203.61	2617.67 S	964.82 E	2617.67	0.23
10251.00	92.32	180.02	7201.61	2713.64 S	964.80 E	2713.64	2.35
10441.00	90.34	175.84	7197.20	2903.41 S	971.66 E	2903.41	2.43
10536.00	90.56	173.66	7196.45	2998.01 S	980.35 E	2998.01	2.31
10631.00	89.88	173.46	7196.09	3092.41 S	991.01 E	3092.41	0.75
10726.00	90.65	175.30	7195.65	3186.94 S	1000.31 E	3186.94	2.10
10822.00	89.54	175.61	7195.49	3282.64 S	1007.92 E	3282.64	1.20
10917.00	90.43	178.21	7195.52	3377.49 S	1013.04 E	3377.49	2.89
11012.00	91.48	182.24	7193.93	3472.46 S	1012.67 E	3472.46	4.38
11107.00	92.06	181.31	7191.00	3567.37 S	1009.73 E	3567.37	1.15
11202.00	90.96	181.55	7188.49	3662.30 S	1007.36 E	3662.30	1.19
11297.00	90.46	181.15	7187.32	3757.27 S	1005.12 E	3757.27	0.67
11392.00	89.88	181.17	7187.04	3852.25 S	1003.19 E	3852.25	0.61
11487.00	90.09	180.52	7187.06	3947.24 S	1001.79 E	3947.24	0.72
11582.00	90.25	182.14	7186.78	4042.21 S	999.59 E	4042.21	1.71
11677.00	90.25	182.56	7186.36	4137.13 S	995.69 E	4137.13	0.44
11772.00	90.28	183.06	7185.92	4232.01 S	991.04 E	4232.01	0.53
11867.00	90.49	181.17	7185.29	4326.94 S	987.53 E	4326.94	2.00
11962.00	89.78	181.10	7185.06	4421.92 S	985.65 E	4421.92	0.75
12057.00	89.47	180.97	7185.68	4516.90 S	983.93 E	4516.90	0.35
12176.00	90.55	180.83	7185.66	4635.89 S	982.06 E	4635.89	0.92
12220.00	90.55	180.83	7185.24	4679.88 S	981.43 E	4679.88	0.00

**CALCULATION BASED ON MINIMUM CURVATURE METHOD**

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT  
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD  
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 180.00 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.52 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12220.00 FEET  
IS 4781.68 FEET ALONG 168.16 DEGREES (TRUE)**

**All directional surveys tied on to the last gyro survey at 904.00' MD.**